WHITE PINE BLISTER RUST CONTROL

IN THE

NORTHWESTERN REGION

January 1 to December 31, 1950

United States Department of Agriculture
Agricultural Research Administration
Bureau of Entomology and Plant Quarantine
Division of Plant Disease Control
Blister Rust Control
618 Realty Building
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Calendar Year 1950
Herman E. Swanson, Regional Leader

The blister rust control program of 1950 was the same size as in the two previous seasons. Seventeen percent more ground was covered in 1950 than in 1949, a trend which has continued since the war. From a high of 1.32 man-days per acre in 1944, the man-day requirement has dropped to .76. A large part of this reduction is a result of improvement in ribes eradication methods. Two recent innovations in hand methods that have yielded great benefit to blister rust control work have been the adoption of contractual procedure for the eradication of ribes to specified standards on given areas and the development of a one-man dragline method for force-account labor by which an individual working alone can systematically cover an area. Each method fixes individual responsibility for both the amount and the quality of work which was not readily determinable when men worked in crews. Another important development has been in the chemical eradication of ribes which is tending to revolutionize methods of blister rust control. These improvements will be described in succeeding paragraphs.

Progress in 1950

The agencies directly engaged in ribes eradication were as follows:

Agencies	No. Camps	No. Workers
Bureau of Entomology and Plant Quarantine (State of Idaho, Clearwater, Potlatch, and Priest Lake Timber Protective Associations as cooperators)	7	259
U. S. Forest Service	27	977
National Park Service	4	83
Totals	38	1,319

The accomplishments under each work program were as follows:

Agency	Initial Work Acres	Rework Acres	Total Acres	Total Man-Days	Destroyed Ribes	Per Acre Man-Days	Per Acre Ribes
Bur. of Ent. & Pl. Quar.	2,160	8,640	10,800	8,490	657,000	.79	61
Forest Service	8,620	37,020	45,640	34,110	2,222,000	.75	49
National Park Service	3,590	1,880	5,470	4,370	499,000	.80	91
Total	14,370	47,540	61,910	46,970	3,378,000	.76	55

Coordination of Blister Rust Control and Timber Management

Additional progress was made in 1950 in the integration of blister rust control with white pine management practices. This included the analysis and selection of the areas where white pine will be grown and protected and cutting methods or silvicultural treatments applied which will reduce the ribes eradication problem and provide the highest possible growth of white pine.

The first region-wide evaluation and selection of white pine areas to be included in the Inland Empire blister rust control area was made in 1934 when 2.7 million acres were selected from a total white pine area of 3.6 million acres. In view of the present small program which is sufficient to handle only one-fourth of the immediate job on the entire control area, a thorough analysis was made of all white pine units and a selection was made of the top priority units on which control work will be concentrated during the next 5-year period. These units will provide the highest future yield of white pine in the next 120-year period per dollar expended. In the present 5-year program are 84 units of National Forest land with 470,000 acres suitable for growing white pine and 23 units of state, private, and intermingled federal lands with 148,000 acres suitable for growing white pine. In the 0-70 year age classes of timber on these units are future yields of 5.7 billion bd. ft. of white pine on the Forest Service units and 1.94 billion bd. ft. on the units to be handled by the Bureau of Entomology and Plant Quarantine.

Considerable attention was directed by public and private agencies to better coordination of management and protection measures related to the growing of white pine. According to conditions, partial cutting, clear cutting and broadcast burning, leaving cedar intact in stream bottoms and caps of mixed timber on ridges, were some of the procedures followed to reduce the ribes menace and to facilitate protection of the new crop of white pine.

Within the selected units on National Forest lands, the Forest Service considered the blister rust problem in connection with all timber sales. Several field inspections including foresters and blister rust control supervisors were held on the ground to determine cutting procedure and timber stand improvement measures to be followed. In many instances, timber stand improvement funds were collected with the stumpage price to be used for ribes suppression. State and private foresters are also giving attention to the application of cutting practices and slash disposal methods which will minimize the ribes problems within the state and private units. They are requesting more information each year from the blister rust control office regarding the condition of their white pine stands, and as in the case of federal units, several field inspections have been made to consider the best procedures to follow.

Ribes Eradication by Chemical Methods

The most important developments in ribes eradication have been in the use of chemicals. In 1947, experimental work was started with 2,4,5-T which proved to be effective on all ribes species in the region. Its comparatively low cost has made it possible to use chemical eradication of ribes over larger areas. A total of 3,540 acres was treated in 1950 using 3,670 man-days. Truck-mounted power sprayers and a turbine blower were employed to great advantage, while back-pack

units were used on the scattered isolated areas. Two trials were made to treat recently logged areas on a fast coverage with power equipment. The tests indicated where logging roads are available to power equipment that first working can be done at a fraction of the cost of the manual work. Final comparisons depend upon the percentage of the ribes destroyed by the speedy methods.

Aerial spraying of ribes and brush with 2,4,5-T applied by helicopter was tested in 1949. Results were so satisfactory that additional large-scale treatments involving 1,000 acres were made in 1950. Thus far it has been used on heavy growths of ribes and brush which have been almost insurmountable problems in the past. Some areas were treated to kill the brush for burning. On others, one or two additional treatments are contemplated to secure complete destruction of the ribes. A single coverage averaged $11.10 per acre.

Ribes Eradication by Contract

Ribes eradication by contract continued to expand in 1950 with six of the nine field operations in the Inland Empire issuing ribes eradication contracts. Remote areas with difficult working conditions were successfully handled under contract in 1950. These areas raised the average bid price over previous years. It is estimated that the over-all costs of contract work are at least 25 percent lower than work by force-account labor. A summary of contract work follows:

Year	By Contract	By Camp Labor	Total	Percent Contract	Average Bid Price Per Acre
	Acres	Acres	Acres	Percent	Dollars
1947	180	81,020	81,200	0.2	7.24
1948	830	51,770	52,600	1.6	13.20
1949	3,040	49,960	53,000	5.7	13.43
1950	5,260	56,580	61,840	8.5	14.52

Spread of Blister Rust

Limited scouting in 1950 found blister rust infection on white pine (Pinus albicaulis and P. flexilis) for the first time in Yellowstone National Park, Wyoming; Lemhi County, Idaho; and Ravalli County, Montana. Ribes infection was found for the first time in Cascade County, Montana, which extended the known eastern limit 50 miles in central Montana. Infection on ribes found near Salmon, Idaho, extended the known southern limit 45 miles in this sector. No rust was found as a result of scouting in Grand Teton and Rocky Mountain National Parks.

In the Inland Empire, rust damage is beginning to appear in 100- to 140-year-old timber in Bird, Simmons, and Sisters Creeks on the St. Joe National Forest. The principal damage is occurring in the areas adjacent to the streams. The trees which may be killed within the next 10 to 15 years will probably be salvaged.

Weather conditions in 1950 were less favorable to rust development than normally. Disease surveys indicate that 1944 and 1946 were severe rust years in many parts of the region.

Rust Resistant White Pine

The start of the project to develop rust resistant white pines was described in the 1949 report. Five locations have been selected where progeny and grafted specimens of rust resistant white pine can be planted. In these locations the trees will be exposed to heavy blister rust infection and yet sufficiently isolated from possible pollination by nonresistant white pine. Thus far, 59 western white pine trees that appear fully resistant to blister rust had been found in heavy infection centers. One hundred and thirty-six successful grafts were made from eight of these trees and planted in 1950. Considerable additional work will be done in the winter of 1950 on the grafting of scions from the 59 resistant trees. The objective is to secure 1,500 successful grafts.

With assistance from the Institute of Forest Genetics, controlled pollinations were made in the summer of 1950 among the 25 pollinating and flowering trees. Four hundred and twenty flowering shoots were effectively pollinated including 80 different crosses between rust resistant western white pine trees. While the work in this region is primarily intraspecific on western white pine, 12 interspecific crosses were made using other white pine species. It is expected that in 1952 there may be 92 crosses available for testing the inheritance of rust resistance in the F_1 progeny.

SUMMARY OF PROGRESS

A summary of blister rust control activities in the Northwestern Region is presented in the following tables:

TABLE 1

SUMMARY OF RIBES ERADICATION BY STATES AND OPERATING AGENCIES - 1950

State	Operating Agency	First Working			Second Working			Other Workings			All Workings			Per Acre		Number of Camps	Total Seasonal Employees
		Acres	Destroyed Ribes	Man-Days	Acres	Destroyed Ribes	Man-Days	Acres	Destroyed Ribes	Man-Days	Acres	Destroyed Ribes	Man-Days	Ribes	Man-Days		
Idaho	BEPQ	2,160	486,000	2,170	4,000	128,000	3,580	4,640	43,000	2,740	10,800	657,000	8,490	61	.79	7	259
	FS	2,860	964,000	1,790	13,480	243,000	11,070	16,950	325,000	12,810	33,290	1,532,000	25,670	46	.77	22	757
	Subtotal	5,020	1,450,000	3,960	17,480	371,000	14,650	21,590	368,000	15,550	44,090	2,189,000	34,160	50	.77	29	1,016
Montana	FS	5,640	363,000	3,820	2,630	148,000	2,210	750	14,000	180	9,020	525,000	6,210	58	.69	4	195
	NPS							480	24,000	400	480	24,000	400	50	.83	1	9
	Subtotal	5,640	363,000	3,820	2,630	148,000	2,210	1,230	38,000	580	9,500	549,000	6,610	58	.70	5	204
Washington	FS	120	3,000	80	1,380	10,000	790	1,830	152,000	1,360	3,330	165,000	2,230	50	.67	1	25
	NPS							630	26,000	360	630	26,000	360	41	.57	1	10
	Subtotal	120	3,000	80	1,380	10,000	790	2,460	178,000	1,720	3,960	191,000	2,590	48	.65	2	35
Colorado	NPS	3,200	228,000	2,350							3,200	228,000	2,350	71	.73	1	38
Wyoming	NPS	390	129,000	650	770	92,000	610				1,160	221,000	1,260	191	1.09	1	26
All States	BEPQ	2,160	486,000	2,170	4,000	128,000	3,580	4,640	43,000	2,740	10,800	657,000	8,490	61	.79	7	259
	FS	8,620	1,330,000	5,690	17,490	401,000	14,070	19,530	491,000	14,350	45,640	2,222,000	34,110	49	.75	27	977
	NPS	3,590	357,000	3,000	770	92,000	610	1,110	50,000	760	5,470	499,000	4,370	91	.80	4	83
	Total	14,370	2,173,000	10,860	22,260	621,000	18,260	25,280	584,000	17,850	61,910	3,378,000	46,970	55	.76	38	1,319

TABLE 2

ACREAGE WORKED BY LAND OWNERSHIP - 1950

Land Ownership	First Working Acres	Second Working Acres	Other Workings Acres	All Workings Acres
National Forest Region 1	8,200	17,280	16,060	41,540
National Park	3,090	770	1,110	4,970
Public Domain			470	470
State and Private	3,080	4,210	7,640	14,930
Total	14,370	22,260	25,280	61,910

TABLE 3

SUMMARY OF EXPENDITURES - FEDERAL AND COOPERATIVE - 1950

State	Federal Funds					Cooperative Funds			Total All Funds	Expenditures Ribes Eradication
	Entomology and Plant Quarantine W-a.14	Entomology and Plant Quarantine W-e.14	Forest Service	Park Service	Total Federal Funds	Direct Aid	Indirect Aid	Total (Direct and Indirect Aid)		
Idaho	$103,282	$104,693	$736,860*		$ 944,835	$40,388	$2,000	$42,388	$ 987,223	$ 881,941
Mont.	18,051		174,077	$ 7,696	199,824		1,000	1,000	200,824	181,773
Wash.	15,305		57,600	11,072	83,977		1,000	1,000	84,977	68,672
Colo.	4,753			33,984	38,737				38,737	33,984
Wyo.	4,753			23,865	28,618				28,618	23,865
Total	$146,144	$104,693	$968,537	$76,617	$1,295,991	$40,388	$4,000	$44,388	$1,340,379	$1,190,235

*Forest Service expenditures include $5,292 K-V funds

TABLE A

STATUS OF RIBES ERADICATION BY STATES - ALL OWNERSHIPS, DECEMBER 31, 1950
Accumulative Series - Net

State	Total Acres		First Working		Second Working	Other Workings	On Maintenance		Remaining Work	
	White Pine	Control Area (Wh.P.& Prot.Zone)	Acres	Percent	Acres	Acres	Acres	Percent	Unworked Acres	Requiring Rework Acres
Idaho	1,875,000	2,188,000	1,424,000	65	461,000	160,000	503,000	23	764,000	921,000
Montana	205,140	213,140	151,140	71	23,620	9,050	84,170	39	62,000	66,970
Washington	124,500	135,500	101,500	75	37,300	23,510	29,060	21	34,000	72,440
Colorado	6,000	6,000	3,200	53			2,100	35	2,800	1,100
Wyoming	9,600	9,600	9,590	100	2,330	150	6,890	72	10	2,700
Total	2,220,240	2,552,240	1,689,430	66	524,250	192,710	625,220	24	862,810	1,064,210

TABLE B

SUMMARY OF STATUS OF RIBES ERADICATION BY LAND OWNERSHIP, DECEMBER 31, 1950
Accumulative Series - Net

Land Ownership	Total Acres		First Working		Second Working	Other Workings	On Maintenance		Remaining Work	
	White Pine	Control Area (Wh.P.& Prot.Zone)	Acres	Percent	Acres	Acres	Acres	Percent	Unworked Acres	Requiring Rework Acres
National Forests R-1	1,183,000	1,387,000	1,063,000	77	325,000	105,000	369,000	27	324,000	694,000
National Parks	24,510	24,510	21,930	89	10,250	13,710	14,940	61	2,580	6,990
Public Domain	21,000	29,000	14,000	48	6,000	3,000	7,000	24	15,000	7,000
State and Private Lands	991,730	1,111,730	590,500	53	183,000	71,000	234,280	21	521,230	356,220
Total	2,220,240	2,552,240	1,689,430	66	524,250	192,710	625,220	24	862,810	1,064,210

COOPERATIVE BLISTER RUST CONTROL ON STATE AND PRIVATE LANDS

Herman E. Swanson, Regional Leader
Calendar Year 1950

In cooperation with the State of Idaho and the Clearwater, Potlatch, and Priest Lake Timber Protective Associations, the Bureau of Entomology and Plant Quarantine administered the blister rust control program on state and private lands in Idaho.

The small control program of the last 3 years has necessitated considerable retrenchment in the area on which efforts must be concentrated to gain complete protection. A reanalysis of all white pine units supporting immature stands was made and a control plan established that is in line with available funds. Sound plans are evolving for the growing and protection of white pine on the highest priority units where the greatest possible yield can be secured per dollar expended. Management and cutting practices are being followed to produce a high volume of white pine in the protected units. Twenty-three units can be handled under the present program in which the total blister rust control cost will range from $1 to $3 per thousand board feet of white pine protected. These units are as follows:

Location	No. Units	No. Acres	Future White Pine Volume in Stands Under 70 Years Board Feet
Clearwater	8	46,000	795,000,000
Potlatch	7	67,000	780,000,000
Priest Lake	8	45,000	369,000,000
Total	23	158,000	1,944,000,000

Important advancements have been made in the last 4 years in blister rust control methods. Particularly significant in the case of state and private lands because of the great amount of logging is the development in chemical eradication of ribes. The lower cost for treatment with 2,4,5-T has greatly expanded the use of chemicals and will make possible the protection of the new white pine crop on cutover areas for which there had been little hope under the small control program.

Reports on the cooperative work on the Clearwater, Potlatch, and Priest Lake Timber Protective Associations are to be found in the Clearwater, St. Joe, and Kaniksu operation reports.

A summary of the cooperative program in the State of Idaho together with a summary of the work on state and private lands in other northwestern states resulting from the protection of adjacent federal lands are presented in the following tabulations:

1. Allotments

Agency	Fiscal Year 1950	Fiscal Year 1951*
Federal (BEPQ)	$107,350	$100,000
State of Idaho	25,000	25,000
Clearwater T.P.A.	6,609	6,609
Potlatch T.P.A.	5,446	5,446
Priest Lake T.P.A.	4,192	4,192
Total	$148,597	$141,247

* Approximate

2. Field Program and Expenditures - Calendar Year 1950

Operation	Number Camps	Number Workers	Number Contracts	S&P Funds	Federal Funds	Total Funds
Clearwater	3	114	7	$17,630	$ 42,391	$ 60,021
St. Joe (Potlatch)	3	110	--	17,527	41,799	59,326
Kaniksu (Priest Lake)	1	35	5	5,231	20,503	25,734
Total	7	259	12	$40,388	$104,693	$145,081

(Total expenditure State and private funds for all years 1928-1950: State of Idaho, $287,640; Timber Protective Assns., $231,470; Total $519,110.)

3. Cooperative Ribes Eradication in Idaho, 1950

Operation	Initial Work Acres	Rework Acres	Total Worked Acres	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes
Clearwater	420	3,010	3,430	3,140	133,000	.91	39
St. Joe	1,190	3,630	4,820	4,020	470,000	.83	98
Kaniksu	550	2,000	2,550	1,330	54,000	.52	21
Total	2,160	8,640	10,800	8,490	657,000	.79	61

4. State and Private Lands Worked in 1950

State	First Working Acres	Second Working Acres	Other Workings Acres	Total Worked Acres
Idaho	2,050	4,190	7,290	13,530
Montana	530	20	350	900
Colorado	500	-	-	500
Total	3,080	4,210	7,640	14,930

5. Net Progress on State and Private Lands, 1923-1950

State	First Working Acres	Second Working Acres	Other Workings Acres	Maintenance Acres	Unworked Acres	Control Area Total Acres
Idaho	564,000	179,000	68,000	217,000	503,000	1,067,000
Montana	19,000	2,000	2,000	14,000	14,000	33,000
Washington	7,000	2,000	1,000	3,000	4,000	11,000
Colorado	500	-	-	280	230	730
Total	590,500	183,000	71,000	234,280	521,230	1,111,730

REGIONAL SUMMARY OF THE FOREST SERVICE OPERATIONS

Calendar Year 1950

G. M. DeJarnette, Forester in Charge
Blister Rust Control, U.S.F.S., Region One

Region wide the 1950 season was very successful. A late opening spring delayed the start of the spring work on most forests, but a very successful recruiting program tended to overcome the handicap of the late start.

Labor was more plentiful and more stable than at any time since the war. The average age of workers employed was 20 plus. There was much less turnover due to quitting or discharge. Work accomplishment per man-day was good.

Man-day costs have not been completely calculated, but it appears that they will at least be no higher. The cost per effective man-day may not drop any futher. In fact this figure may increase as the use of chemical, helicopter spraying, and contract work increases. At the same time, the number of man-days per acre should decrease and the total net accomplishment per dollar spent should be greater. This trend we believe will be reflected in the present season's accomplishment record.

The late passage of the appropriation measure with attendant uncertainty as to the final action necessitated an early cessation of work on most units. Many man-days of work at what would otherwise have been the peak of production for the season were thereby lost. Such disruption factors have been in the past and continue to be one of the most troublesome and costly aspects of the fight against blister rust. They have resulted in the loss of many millions of feet of white pine yield which would have come on the market toward the end of this rotation.

Stabilization of effort on a unit basis has been a very definite forward step in the right direction. Stabilization of financing under the unit plan of action would be another if it could come to pass.

Some of the aspects of the work which have received particular emphasis on the Forest Service side of the operation are covered in the following discussion:

Work on the analysis of white pine units has been continued throughout 1950. At the beginning of the year primary attention was given to those units containing substantial amounts of white pine reproduction and pole. By March, 151 national forest units of this type were analyzed using the very latest information on rust damage, stocking, and composition as obtained from stocking-damage surveys.

A meeting was held in the Federal Building in Missoula, March 15-17 at which time the major findings from this analysis were outlined. Administrative officers of both the Forest Service and the Bureau of Entomology and Plant Quarantine attended. A tentative 5-year program for the Forest Service based on the priority of units as determined by the analysis was worked out and approved at this meeting. A more definite program was later worked out, based on the recommendations of the meeting and is now in effect.

The analysis showed that with continuance of appropriations equivalent to that of fiscal year 1950, the urgent work needed to protect the immature white pine stands could be accomplished on only 84 of the 151 units in the next 5 years. The 84 units selected were those in which the greatest potential volume of white pine could be saved per dollars spent. The rate at which the damage to unprotected stands is building up, as shown by disease surveys, makes the outlook for the future of the white pine pole and reproduction in the remainder of the 151 units pretty dubious. All units analyzed were given a priority listing so that the program could be adjusted to fit any change in appropriations, cost elements, or other factors which affect the amount of work which can be accomplished.

It is planned to extend the unit analysis to include units containing white pine land now denuded or supporting mature timber soon to be cut for the purpose of determining the relative cost of growing and protecting future crops of white pine. Community and industry dependency and other important management factors are considered in the selection of units for future crops, although the greatest yield of pine per dollar expended for BRC and other costs is still the major factor in the selection of units.

Favorable results obtained from experimental aerial spraying of brush and ribes with 2,4,5-T chemical solutions by helicopter at Windfall Peak on the Coeur d'Alene National Forest in 1949 led to the expansion of that work to project size in 1950. An aggregate of 960 acres of brushing ribes infested area were sprayed this past season. Six separate areas, two on the Kaniksu forest, two on the Coeur d'Alene, and one each on the Cabinet and St. Joe National Forests were covered. The areas selected were within high priority white pine units and were immediately adjacent to plantations or to natural white pine reproduction stands of high value. Because of the brush density, the working conditions on these areas were such that the estimated cost of ribes eradication by ground forces alone would have been from $50 to $150 per acre. The main purpose of spraying was either to reduce the brush and ribes population so that mop up work by ground crews could be done at nominal cost, or to assist the eradication of ribes through prescribed burning by adding dead brush to the fuels and opening the brush canopy so that surface fuels would dry sufficiently for burning.

One hundred and seventy-six acres of sprayed area were burned in the fall of 1950, and definite plans are being made to burn 110 acres more next year. Portions of some of the sprayed areas support considerable coniferous reproduction. Tentative plans are to respray these portions by helicopter one or more times depending upon the success of the initial application.

Four of the six areas were sprayed during the period July 1 to July 12. At this time, in cooperation with the Bureau of Entomology, 4 of the 12 experimental plots at Windfall Peak were resprayed. Two large areas, one each on the Cabinet and the Coeur d'Alene, were sprayed between August 17 and August 26.

All areas were sprayed with 2,4,5-T ester using as a diluent water containing emulsifiable oil. The average total cost per acre sprayed was $11.10. An average of 24½ acres was sprayed per hour on the job of helicopter flying time and 0.13 man-day per acre was required for flagging, loading, and mixing of chemical. The following table shows the acres sprayed, amount of solution applied, and the concentrations used on each project:

Project	Forest	Acres	Gal. Spray Per Acre	2,4,5-T and Equiv. Per Acre	Purpose of Spraying
*Preston Knob	St. Joe	78	10	1 lb.	Assist prescribed burn
*Diamond Ridge	Kaniksu	**90	10	1 lb.	" " "
Kalispell Rock	Kaniksu	150	10	1 lb.	" " "
*Independence Cr.	Coeur d'Alene	43	10	1 lb.	Eliminate brush-ribes
*Minton Ridge (A)	Cabinet	38	5	½ lb.	" " "
Minton Ridge (B)	Cabinet	30	15	1½ lb.	" " "
Minton Ridge (C)	Cabinet	148	10	1 lb.	" " "
Packsack Ridge	Coeur d'Alene	383	10	1 lb.	" " "

* Sprayed at brush level. All others were sprayed at snag level.

** Contour strips 44 feet wide were alternately sprayed and left unsprayed on 52 acres.

The Windfall Peak plots are not included since a report on them is made in a separate section.

A special report on spraying by helicopter is being made and can be secured from the U. S. Forest Service, Missoula, Montana, or the Office of Blister Rust Control, Spokane, Washington.

Prescribed burning as an effective means of reducing ribes eradication costs was continued in 1950. Areas on three forests were burned in late August and September. Fifty-six acres in Preston Creek on the St. Joe were burned with excellent results. This area, immediately adjacent to one burned in 1949, had been sprayed with 2,4,5-T in July. On the Kaniksu a large area near Kalispell Rock was set up for prescribed burn in 1949. One hundred and seventy acres did not burn because of fuel moisture and weather conditions. Most of this area was sprayed by helicopter in July 1950, and 120 acres were burned successfully in September. To clean up the remaining 50 acres, burning must be done under dryer conditions than existed at the time of burning this fall or perhaps re-spraying will be desirable. One hundred acres of brush and ribes were burned with moderate success on Lost Fork of Jordan Creek on the Coeur d'Alene.

All burned areas will be restocked by planting. Buffer zones and nonwhite pine type will be planted to several mixed species according to site. Planting of white pine will be done after application of necessary blister rust control measures.

A wholehearted effort is being made by all operations to reduce costs by better administration and full utilization of all promising new methods. A detailed financial statement is now required from each operation. From these and man-day summary records, it will be possible to break down and analyze each phase of the work, make comparisons between administrative units, and determine where and how costs may be further reduced.

The effectiveness of the 6-day week in reducing project costs was shown by analysis of man-day reports. The Forest Service camps gained 4,616 effective work days on ribes eradication through the privilege of working Saturdays. The costs of camp construction, dismantling, equipment rental, crew training, and the like constitute a large proportion of the total project cost and are more or less fixed regardless of the number of work days in the season. Thus, the gain of 4,616 effective work days over which these fixed costs could be prorated resulted in a cheaper cost per unit of accomplishment. Analysis of 1950 data shows that through the 6-day week, a saving of $80,000 was made in the region as a whole.

The expenditures and progress in blister rust control by the U. S. Forest Service are summarized in the following tables:

1. Expenditures

Forest	Regular Funds 1950	Regular Funds 1930-1950	Emergency Funds 1933-1950	Total
Clearwater	$189,311	$1,702,473	$ 413,455	$ 2,115,928
St. Joe	251,300	3,080,419	383,340	3,463,759
Coeur d'Alene	168,041	1,820,242	669,810	2,490,052
Kaniksu	185,808	1,800,478	458,055	2,258,533
Cabinet	78,466	730,590	258,477	989,067
Kootenai	95,611	555,093	28,233	583,326
Total	$968,537	$9,689,295	$2,211,370	$11,900,665

2. Ribes Eradication by Forest Service Crews in 1950

Forest	Initial Work Acres	Rework Acres	Total Worked Acres	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes
Clearwater	1,620	9,510	11,130	5,160	911,000	.46	82
St. Joe	210	9,180	9,390	9,080	185,000	.97	20
Coeur d'Alene	790	6,350	7,140	6,360	198,000	.89	28
Kaniksu	360	8,600	8,960	7,300	403,000	.81	45
Cabinet	780	1,720	2,500	3,380	251,000	1.35	100
Kootenai	4,860	1,660	6,520	2,830	274,000	.43	42
Total	8,620	37,020	45,640	34,110	2,222,000	.75	49

3. Net Progress on National Forest Lands, 1923-1950

Forest	First Working Acres	Second Working Acres	Other Workings Acres	Maintenance Acres	Unworked Acres	Control Area Total Acres
Clearwater	154,000	60,000	22,000	41,000	46,000	200,000
St. Joe	201,000	99,000	37,000	74,000	94,000	295,000
Coeur d'Alene	310,000	61,000	21,000	90,000	51,000	361,000
Kaniksu	272,000	87,000	21,000	97,000	84,000	356,000
Cabinet	67,000	11,000	4,000	31,000	9,000	76,000
Kootenai	59,000	7,000	-	36,000	40,000	99,000
Total	1,063,000	325,000	105,000	369,000	324,000	1,387,000

BLISTER RUST CONTROL ON NATIONAL PARKS

Herman E. Swanson, Regional Leader

Calendar Year 1950

Reports have been prepared for each of the four National Parks in the Northwestern Region on which blister rust control is being conducted. Very satisfactory progress has been made, and in recent years the work has been abreast of the proper time schedules. Initial ribes eradication is now complete on the control areas in Mount Rainier, where mop-up and maintenance work on ribes suppression have been going on for 2 years, in Glacier and in Yellowstone (with the exception of 10 acres of cliff area to be covered in 1951). In Yellowstone, a possible extension of the control area by an addition of 3,500 acres to the Mount Washburn unit is being considered by National Park Service officials.

An excellent start was made on the 6,000-acre control area in Rocky Mountain where more than half of the area was initially worked in 1950. Chemical methods recently developed are a great advantage to this job and fortunately they could be used on the first working. Additional tests were made in 1950 which may prove even more practical in this park.

Expenditures and progress in blister rust control are presented in the following summaries:

1. Expenditures by National Park Service

National Park	Calendar Year 1950	All Years
Mount Rainier	$11,072	$145,756
Glacier	7,696	139,233
Yellowstone	23,865	161,047
Rocky Mountain	33,984	45,135
Total	$76,617	$491,171

2. Ribes Eradication in 1950

National Park	First Working Acres	Second Working Acres	Other Workings Acres	Total Acres	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes
Mount Rainier	-	-	630	630	360	26,000	.57	41
Glacier	-	-	480	480	400	24,000	.83	50
Yellowstone	390	770	-	1,160	1,260	221,000	1.09	191
Rocky Mountain	3,200	-	-	3,200	2,350	228,000	.73	71
Total	3,590	770	1,110	5,470	4,370	499,000	.80	91

3. Gross Acreage Worked, 1930-1950

National Park	First Working Acres	Second Working Acres	Other Workings Acres	Total Acres	Man-Days	Ribes	Per Acre Man-Days	Per Acre Ribes
Mount Rainier	8,260	4,690	10,730	23,680	24,970	2,450,000	1.05	103
Glacier	5,140	3,620	3,050	11,810	12,820	1,283,000	1.09	109
Yellowstone	9,590	2,330	150	12,070	9,630	1,373,000	.80	114
Rocky Mountain	3,200	-	-	3,200	2,350	228,000	.73	71
Total	26,190	10,640	13,930	50,760	49,770	5,334,000	.98	105

4. Net Control Area Status

National Park	First Working Acres	Second Working Acres	Other Workings Acres	Maintenance Acres	Unworked Acres	Control Area Acres
Mount Rainier*	4,500	4,300	10,510	3,060	-	4,500
Glacier	5,140	3,620	3,050	3,170	-	5,140
Yellowstone	9,590	2,330	150	6,890	10	9,600
Rocky Mountain	3,200	-	-	2,100	2,800	6,000
Total	22,430	10,250	13,710	15,220	2,810	25,240

*Resurvey added 400 acres to first and second workings and to the control area.

SPREAD OF WHITE PINE BLISTER RUST

Scouting in Montana, Wyoming, Idaho, and Colorado, 1950
By J. C. Gynn and C. M. Chapman

The continuing spread of white pine blister rust is shown by the discovery of infection on white pine for the first time in Ravalli County, Montana; Lemhi County, Idaho; and Park County, Wyoming. The disease on ribes was found for the first time in Cascade County, Montana, in one new drainage in Lemhi County, Idaho, and in one new drainage in Park County, Wyoming.

White Pine Infection Locations

1. Ravalli County, Montana: Bitterroot National Forest, T. 1 S., R. 19 W., sec. 33. The host Pinus albicaulis was infected with a fruiting canker on 1946 wood, probably of 1947 origin.

2. Lemhi County, Idaho: Salmon River drainage, Salmon National Forest, T. 27 N., R. 21 E., sec. 4. The host P. albicaulis was infected with a fruiting canker on 1946 wood, probably of 1947 origin.

3. Park County, Wyoming: Yellowstone National Park, Slide Lake Creek, Gardiner River drainage in unsurveyed T. 10 S., R. 8 E., sec. 2. The host P. flexilis or P. albicaulis was infected with a juvenile canker on 1947 wood, probably of 1948 origin.

Infection on ribes has been found during the past several years near the infected white pine discovered in 1950.

Ribes Infection Locations

1. Cascade County, Montana: Belt Creek drainage 25 miles southeast of Great Falls, T. 17 N., R. 6 E., sec. 14. The infected host was Ribes setosum.

2. Lemhi County, Idaho: Salmon River drainage 12 miles south of Salmon, T. 19 N., R. 21 E., sec. 5. The infected host was R. petiolare.

3. Park County, Wyoming: Yellowstone National Park, Lamar River drainage 5 miles east of Tower Falls Ranger Station in unsurveyed T. 10 S., R. 11 E., sec. 36. The infected host was R. petiolare.

All other infected ribes found in 1950 were in the vicinity of previously reported infection centers.

Although scouting has been done for a number of years in Colorado, no blister rust has been found.

SCOUTING SUMMARY, 1950

MONTANA, WYOMING, IDAHO, COLORADO

Forest Unit	Drainages Sampled	Ribes Examined	Pine Examined	New Ribes Infection Centers	New Pine Infection Centers
Rocky Mountain N. P., Colorado	16	935	658		
Washakie (Shoshone) N.F., Wyo.	7	231	237		
Shoshone N.F., Wyo.	4	198	107		
Teton N.F., Wyo.	6	408	33		
Targhee N.F., Idaho and Wyo.	4	296	18		
Grand Teton N.P., Wyo.	5	645	211		
Yellowstone N.P., Wyo.	8	935	623	1	1
Crater of the Moon N.M., Idaho	1	78	50		
Salmon N.F., Idaho	5	81	18	1*	1
Bitterroot N.F., Mont.	1	2	30		1
Lewis & Clark N.F., Mont.	1	15	35	1*	
Total	58	3,824	2,020	3	3

*Adjacent to National Forest boundary

BLISTER RUST CONTROL, INLAND EMPIRE, 1950

By
Frank O. Walters
Assistant Regional Leader

Introduction

There has been an encouraging upward trend in accomplishments over the past 4 years. Output was greater per man-day this year than at any time since 1935 when large areas of light ribes populations were given initial protection. More acreage was worked during the current season than at any time since 1941 with the exception of 1947 when available funds were 17 percent greater and emphasis was placed on completing protection of easily worked pole stands. A comparison between 1945 and 1950 seasons shows that with 15,900 fewer man-days, 9,900 more acres were worked. Over-all progress is even better than the progress figures indicate. With the advent of an effective chemical, many difficult situations are now being handled that had previously been deferred due to excessive costs. In addition, under the block system of checking, a higher percentage of the worked area is examined for missed ribes assuring a more efficient job.

Hand Ribes Eradication

The application and integration of improved hand and chemical methods have increased production and efficiency. The dragline system of ribes eradication on the lot basis is now well established on all operations. As the background of experience in this method has grown, increased production has resulted. Still further gains should be made with additional refinements. Often draglines are run too close together, reducing the amount of ground covered per strip. Inconsistent widths of lot lanes handicap the worker. When lanes are too narrow, draglines have to be moved more often than necessary; when too wide, the lines will not span the lane. Confusion and loss of time result. With alert supervision and additional training, such faults can be corrected.

Contract Work

Ribes eradication by contract continued to expand. Five thousand, two hundred and sixty acres or 8.5 percent of all work accomplished was by this method. Contractors were generally better equipped and with few exceptions made reasonable profits. Supervisory personnel are realizing the possibilities of contract work as a means of increasing accomplishments and are pushing this method of work. The system was originally used as a means of making the final cleanup on areas of light ribes population. At present all areas feasible to work by hand are contract possibilities. A summary of contract work for 1950 follows:

Contracts	Acres Worked	Man-Days	Ribes	Funds Paid to Contractors (Dollars)	Per Acre		
					Man-Days	Ribes	Cost (Dollars)
92	5,260	4,084	152,016	78,686	.78	29	15

Chemical Ribes Eradication

The importance of chemical work in the program becomes more apparent each season. This year large areas of cutover, burn, massed upland, and stream type ribes were effectively handled at a fraction of previous costs. A total of 2,820 acres was treated as against 1,430 acres last season. Various types of equipment were used including a helicopter, turbine blower, knapsack units, and Hi-Fog guns. The mobile 400-gallon power spray units continued to perform the bulk of the spray work.

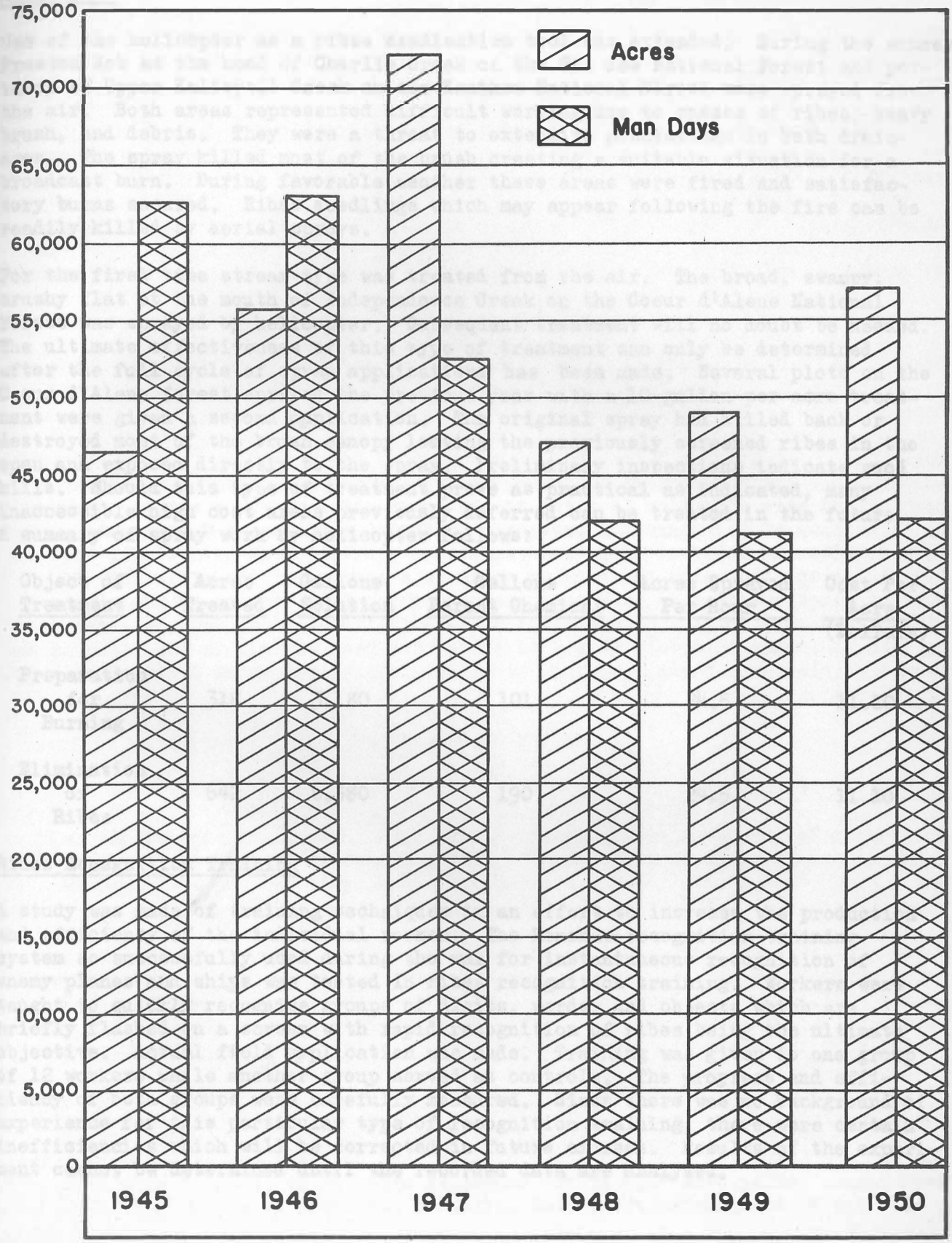
Logged-over lands can now be effectively treated. It is important that work starts as soon after logging as ribes germination makes the treatment practical. In 1950, work was initiated on the Clearwater operation on the Browns Creek area the third year following cutting. The bulk of the ribes seedlings occurs along the roads and skid trails and at this stage are readily killed by hormone sprays. By using the turbine blower on these areas, a high percentage of the workload can be easily eliminated. Follow-up treatments are usually necessary. In the complete treatment of an area, power units using main line hose and lateral leads, knapsack or Hi-Fog gun units are needed to treat ground not reached by the blower. Treatment is more economically applied to recent cutover areas. The absence of established brush cover reduces the chemical solution needed for complete coverage and is not an impeding factor to rapid progress. Other factors favoring the early treatment of disturbed areas are: retarding the build-up of rust, preventing the rapid development of heavy competing brush covers, maintaining a good coniferous seedbed, and preventing the reseeding of ribes.

Since on any large cutover area a combination of several types of spray equipment will be used, careful advance planning is necessary to determine the equipment and chemical best suited to the area. Experiments indicate that an improved type of nozzle applying greater volumes of dilute chemical solutions will accelerate broadcast spraying operations.

On many forests the heavy growth of roadside brush seriously obstructs the road right of way. Slashing away the brush by hand is costly and offers only temporary relief. Cooperating with the Forest Service, the Bureau operated the turbine blower in these troublesome situations on several national forests. Results at the end of the season appear satisfactory, the brush being killed back 20 feet from the road. It is probable that with three properly timed treatments, suppression of roadside brush is possible for long periods at a reasonable cost. Chemical ribes eradication work is summarized as follows:

Equipment	Acres Sprayed	Man-Days	Gallons Solution	Ribes Sprayed	Per Acre Man-Days	Per Acre Gallons	Per Acre Ribes
Power	1,985	983	74,300	1,016,300	.49	37	512
Knapsack	580	856	10,000	93,400	1.48	17	161
Hi-Fog	178	345	1,000	63,500	1.94	6	355
Blower	77	16	6,700	22,300	.21	87	290
Total	2,820	2,200	92,000	1,195,500	.78	33	424

PRODUCTION BY YEARS — ALL CLASSES OF CAMPS



Helicopter

Use of the helicopter as a ribes eradication tool was extended. During the summer Preston Nob at the head of Charlie Creek on the St. Joe National Forest and portions of Upper Kalispell Creek on the Kaniksu National Forest were sprayed from the air. Both areas represented difficult working due to masses of ribes, heavy brush, and debris. They were a threat to extensive plantations in both drainages. The spray killed most of the brush creating a suitable situation for a broadcast burn. During favorable weather these areas were fired and satisfactory burns secured. Ribes seedlings which may appear following the fire can be readily killed by aerial sprays.

For the first time stream type was treated from the air. The broad, swampy, brushy flat at the mouth of Independence Creek on the Coeur d'Alene National Forest was sprayed by helicopter. Subsequent treatment will no doubt be needed. The ultimate effectiveness of this type of treatment can only be determined after the full cycle of spray applications has been made. Several plots on the Coeur d'Alene forest sprayed the previous year with a 10-gallon-per-acre treatment were given a second application. The original spray had killed back or destroyed most of the brush canopy leaving the previously screened ribes in the open and exposed directly to the spray. Preliminary inspections indicate good kills. Should this type of treatment prove as practical as indicated, many inaccessible high cost areas previously deferred can be treated in the future. A summary of spray work by helicopter follows:

Object of Treatment	Acres Treated	Gallons Solution	Gallons Parent Chemical	Acres Sprayed Per Hour	Cost Per Acre (Dollars)
Preparation for Burning	318	3,180	101	24.5	11.10
Elimination of Ribes	642	6,380	190	24.5	11.10

Ribes Recognition Training

A study was made of training techniques in an effort to increase the production and efficiency of the individual worker. The Renshaw recognition training system so successfully used during the war for instantaneous recognition of enemy planes and ships was tested in ribes recognition training. Workers were taught to quickly recognize groups of digits, words, and objects which are briefly flashed on a screen with rapid recognition of ribes being the ultimate objective. Actual field application was made. Training was given to one group of 12 workers while another group served as controls. The progress and efficiency of both groups were carefully measured. Since there was no background of experience for this particular type of recognition training, there were certain inefficiencies which will be corrected in future courses. Results of the experiment cannot be determined until the recorded data are analyzed.

Surveys

The bulk of pine stocking and disease survey work has been completed and will be a minor phase of future surveys. There will be need occasionally for unit re-appraisals of certain drainages.

The Forest Service at present is appraising its mature stands by making cruises to determine white pine producing potential in order to set up proper management plans for the most suitable units.

As a result of the analysis of the pine disease and stocking survey data taken on the Mt. Spokane operation last year, these lands have been dropped from the control area and no longer appear in the annual report tabulations of net acreage.

Checking

Operations utilized checkers' time not needed on regular check for post check and testing of maintenance areas by the strip method. This phase of the work has been lagging behind but is gradually being brought up to date.

The type of regular check now used gives a better concept of the quality of work accomplished by the eradication crews. A higher percentage of the worked area is sampled and more attention is given to the examination of ribes sites. However, to be certain of the degree of protection afforded any area, a determination must be made after an interval of 3 to 5 years by a post check as to how well the work is holding up. Actually the regular check is a measure of the efficiency of current ribes eradication work, and the post check is a measure of the adequacy of the protection afforded to the stand. Examinations of maintenance areas must be made at longer intervals to see if there have been changes in the stand as the result of blowdown, burns, logging, or other disturbances which would alter status of protection.

REVIEW OF OPERATIONS

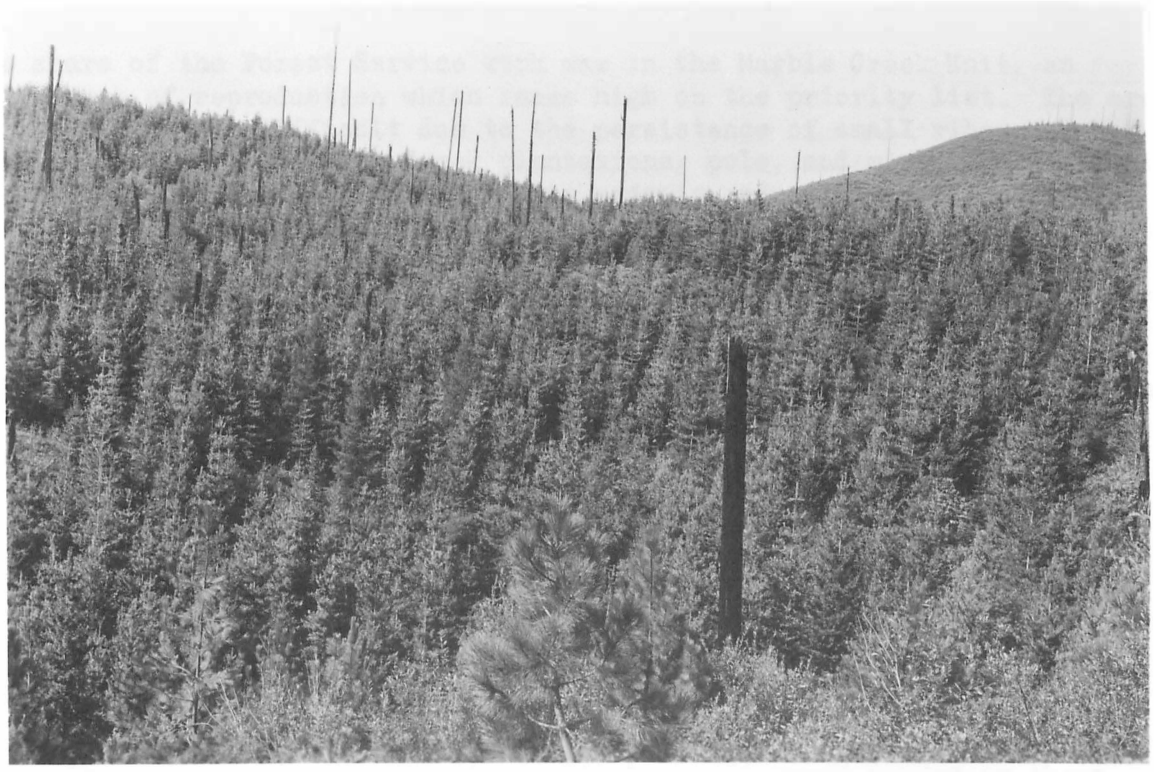
Clearwater Operation

The Forest Service continued protection work in the excellent pole stands in Tamarack Creek and Lower French Creek. Extensive chemical work was performed in the Sheep Mountain area to suppress ribes along skid trails and roads. Outstanding progress was made in all phases of operation.

Bureau activities were restricted to the protection of cutover areas in Mutton Gulch, Rhodes Creek, Flat Creek in the Pierce area, and on Deer and Reeds Creeks in the vicinity of Clearwater Timber Protective Association headquarters. Foresters of the Potlatch Timber Company are cooperating closely with blister rust supervisors in an effort to carry on cutting practices which will minimize control problems. Field conferences have been held periodically.

St. Joe Operation

The St. Joe operation expanded their chemical and contract operations during the past season taking advantage of the economies afforded by chemical work in cutover areas, and by contracting ribes eradication on scattered areas impractical to work from camps.



W-2516-4

An extensive white pine plantation in the Cathedral-Jordan area, Coeur d'Alene National Forest. Planted in 1924 on 1910 burn. Adequate protection from blister rust has made possible this fine stand.

W-2516-2

Close-up showing the rapid growth. Trees are 6 to 10 inches in diameter and 25 to 30 feet in height. Notice distance between whorls.

A large share of the Forest Service work was in the Marble Creek Unit, an extensive area of reproduction which ranks high on the priority list. The area has been particularly difficult due to the persistence of small ribes. Other work was carried on in Charlie Creek plantations, pole, and mixed age stands in Corral and Bear Creeks. Good progress was made in reducing a large part of both units to maintenance standards.

The Bureau operations embraced work on cutover lands in Bob's Creek and reproduction and pole stands in the Cameron drainage. Excellent cutting practices in Bob's Creek have left 40 percent of the original volume to provide a seed source which should result in a well stocked stand of white pine if protection from blister rust is provided. The plan is to follow logging with a rapid chemical treatment using mobile power equipment along roads and skid trails where the bulk of the ribes occurs. Complete coverage of the area will follow as the development of the ribes population indicates the need for work.

Most of the Cameron Creek drainage was placed on maintenance as a result of this season's work.

Coeur d'Alene Operation

Plantations, stands of pole, and reproduction in Hudlow, Iron, Nicholas, and Deception Creeks were given protection. Of the 1,752 acres worked in these drainages, 60 percent was placed on maintenance. In the Tepee and Lower Independence drainages, 3,421 acres of reproduction and pole were worked, 51 percent being placed on maintenance.

Extensive spray work using power, knapsack, and Hi-Fog gun sprayers was done in conjunction with hand methods. Numerous Ribes inerme had become re-established on portions of Tepee Creek originally bulldozed. In some places, small ribes were numerous in grass and sod. Using the power unit in areas of heavy ribes concentrations and knapsack units in places where only scattered patches occurred, effective treatment was secured at a reasonable cost.

Kaniksu Operation

On the Kaniksu operation the Forest Service performed work in the extensive pole stands in the Boulder Creek, Reeder Mountain, and Pelke areas. Plantations and natural reproduction areas were worked in the Lower West Branch, Lamb, Bath, and Kalispell Creek drainages. In all cases, post checks eliminated ribes-free areas preventing useless coverage of areas free of ribes. Contractors did the bulk of the work in the Lower West Branch, Bath, and Lamb Creeks. A five-man chemical crew effectively treated burned-over areas in the vicinity of Diamond Peak and cutover lands in the Pelke and Lower West Branch areas. One Bureau camp worked pole stands in the Trail Creek drainage. Bureau contractors carried on the work in Fox and Caribou Creeks. Timber Management is working closely with the blister rust organization on cutting and management plans for white pine stands. Whenever question exists as to cutting practices or the type of future management to be used, the Forest Service blister rust and timber management staffmen and Bureau representative inspect the area and reach an agreement as to the most adequate methods of marking, cutting, and management.

Cabinet Operation

The Cabinet operation made excellent use of power spray, Hi-Fog gun, and knapsack units to eliminate heavy populations of ribes at the headwaters of Martin and Trout Creeks in the Minton Ridge area. These ribes were a menace to plantations and natural stands of white pine in both drainages. The spray operations covered a 2-year period. All initial work has been completed. With the expenditure of 510 man-days for applying 10,700 gallons of chemical solution, important work has been accomplished at a reasonable cost that would not have been economically feasible by hand methods.

Kootenai Operation

All work was directed toward the protection of pole stands in the Cherry, Burnt, and Red Top drainages. An unusually high percentage of worked area was placed on maintenance; 78 percent of the 6,520 acres worked was placed in this category.

Power spray work was unique. The main line spray hose was suspended from a cable stretched across the Yaak River in order to treat ribes concentrations that otherwise would have been inaccessible to power work.

RESULTS

The following tables show statements of expenditures, results of the 1950 field work, and accumulative results of work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES IN INLAND EMPIRE, 1950

Item	Bureau of Entomology & Plant Quarantine					Forest Service	
		Cooperative Control					
	BLR-1-4	Federal BLR-3-4	State & Private	Total	Total	BLR-4	Total
Salary perm. men	$54,399	$ 6,386		$ 6,386	$ 60,785	$156,734	$ 217,519
Salary temp. men	535	11,928	$ 4,290	16,218	16,753	*	16,753
Wages temp. laborers	2,334	57,272	30,058	87,330	89,664	486,923	576,587
Contract ribes erad.		7,396	6,040	13,436	13,436	58,697	72,133
Subsistence supplies	1,907	17,019		17,019	18,926	147,978	166,904
Chemicals	1,459				1,459	12,166	13,625
Equipment						40,760	40,760
Travel and transp.	3,097	2,445		2,445	5,542	33,947	39,489
Other expenses	3,798	2,247		2,247	6,045	31,332	37,377
Total	$67,529	$104,693	$40,388	$145,081	$212,610	$968,537	$1,181,147

*Included in item "Wages temp. laborers."

Forest Service total includes $5,292 K-V funds expended on Clearwater ($4,281 wages, $1,011 subsistence).

TABLE 2

SUMMARY OF RIBES ERADICATION, 1950
INLAND EMPIRE

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Burn	1940-49	60	30	1,000	.5	17
	Plantation	1940-49	130	130	6,000	1.0	46
	Cutover	1940-49	3,430	2,330	1,334,000	.68	389
	Cutover	1920-39	380	540	30,000	1.42	79
	Reproduction	1910-39	1,020	2,600	217,000	2.55	213
	Pole		4,230	830	52,000	.20	12
	Mature		1,060	340	17,000	.32	16
	Miscellaneous		50	220	7,000	4.40	140
	Stream		420	840	152,000	2.00	362
	Total		10,780	7,860	1,816,000	.73	168
Second	Plantation	1940-49	320	210	7,000	.66	22
	Cutover	1940-49	800	890	34,000	1.11	43
	Cutover	1920-39	2,440	1,830	53,000	.75	22
	Reproduction	1910-39	5,400	4,560	130,000	.84	24
	Pole		11,070	8,510	237,000	.77	21
	Mature		240	120	2,000	.50	8
	Stream		1,220	1,530	66,000	1.25	54
	Total		21,490	17,650	529,000	.82	25
Other	Plantation	1940-49	1,930	1,500	49,000	.78	25
	Cutover	1940-49	380	310	12,000	.82	32
	Cutover	1920-39	2,750	2,850	39,000	1.04	14
	Reproduction	1910-39	9,030	7,230	204,000	.80	23
	Pole		7,480	3,130	74,000	.42	10
	Mature		770	390	19,000	.51	25
	Stream		1,830	1,680	137,000	.92	75
	Total		24,170	17,090	534,000	.71	22
GRAND TOTAL			56,440	42,600	2,879,000	.75	51

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	1,990	1,090	62,000
Second	380	420	6,000
Other	450	690	24,000
Total	2,820	2,200	92,000

TABLE 3

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1950
INLAND EMPIRE

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
							Man-Days	Ribes
Idaho	First	EQ-Coop.	2,160	2,170	486,000	22,270	1.00	225
		FS-Reg.	2,550	1,540	954,000	28,530	.60	374
		FS-Cont.	310	250	10,000		.81	32
		Total	5,020	3,960	1,450,000	50,800	.79	289
	Second	EQ-Coop.	3,580	3,310	108,000	790	.93	30
		EQ-Cont.	420	270	20,000		.64	48
		FS-Reg.	12,220	10,160	208,000	4,440	.83	17
		FS-Cont.	1,260	910	35,000		.72	28
		Total	17,480	14,650	371,000	5,230	.84	21
	Other	EQ-Coop.	4,010	2,370	40,000	170	.59	10
		EQ-Cont.	630	370	3,000		.59	5
		FS-Reg.	14,890	11,020	271,000	8,380	.74	18
		FS-Cont.	2,060	1,790	54,000		.87	26
		Total	21,590	15,550	368,000	8,550	.72	17
	All Workings	EQ-Coop.	9,750	7,850	634,000	23,230	.81	65
		EQ-Cont.	1,050	640	23,000		.61	22
		FS-Reg.	29,660	22,720	1,433,000	41,350	.77	48
		FS-Cont.	3,630	2,950	99,000		.81	27
		Total	44,090	34,160	2,189,000	64,580	.77	50
Montana	First	FS-Reg.	5,640	3,820	363,000	10,900	.68	64
	Second	FS-Reg.	2,540	1,990	121,000	640	.78	48
		FS-Cont.	90	220	27,000		2.44	300
		Total	2,630	2,210	148,000	640	.84	56
	Other	FS-Reg.	750	180	14,000	700	.24	19
	All Workings	FS-Reg.	8,930	5,990	498,000	12,240	.67	56
		FS-Cont.	90	220	27,000		2.44	300
		Total	9,020	6,210	525,000	12,240	.69	58
Washington	First	FS-Reg.	120	80	3,000		.67	25
	Second	FS-Reg.	1,280	730	9,000	160	.57	7
		FS-Cont.	100	60	1,000		.60	10
		Total	1,380	790	10,000	160	.57	7
	Other	FS-Reg.	1,450	1,110	148,000	15,280	.77	102
		FS-Cont.	380	250	4,000		.66	11
		Total	1,830	1,360	152,000	15,280	.74	83
	All Workings	FS-Reg.	2,850	1,920	160,000	15,440	.67	56
		FS-Cont.	480	310	5,000		.65	10
		Total	3,330	2,230	165,000	15,440	.67	50
Total	First	EQ-Coop.	2,160	2,170	486,000	22,270	1.00	225
		FS-Reg.	8,310	5,440	1,320,000	39,430	.65	159
		FS-Cont.	310	250	10,000		.81	32
		Total	10,780	7,860	1,816,000	61,700	.73	168
	Second	EQ-Coop.	3,580	3,310	108,000	790	.92	30
		EQ-Cont.	420	270	20,000		.64	48
		FS-Reg.	16,040	12,880	338,000	5,240	.80	21
		FS-Cont.	1,450	1,190	63,000		.82	43
		Total	21,490	17,650	529,000	6,030	.82	25
	Other	EQ-Coop.	4,010	2,370	40,000	170	.59	10
		EQ-Cont.	630	370	3,000		.59	5
		FS-Reg.	17,090	12,310	433,000	24,360	.72	25
		FS-Cont.	2,440	2,040	58,000		.84	24
		Total	24,170	17,090	534,000	24,530	.71	22
	All Workings	EQ-Coop.	9,750	7,850	634,000	23,230	.81	65
		EQ-Cont.	1,050	640	23,000		.61	22
		FS-Reg.	41,440	30,630	2,091,000	69,030	.74	50
		FS-Cont.	4,200	3,480	131,000		.83	31
		Total	56,440	42,600	2,879,000	92,260	.75	51

TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1950
INLAND EMPIRE

State	Working	Number of Acres Worked																
		By Forest Service					By Bureau of Entomology and Plant Quarantine					Total Federal			Total Other			GRAND TOTAL
		National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	Total	State	Private	Total	
Idaho	First	2,730			130	2,860	240		160	1,760	2,160	2,970		2,970	160	1,890	2,050	5,020
	Second	12,280		620	580	13,480	1,010		970	2,020	4,000	13,290		13,290	1,590	2,600	4,190	17,480
	Other	12,770	320	1,440	2,420	16,950	1,060	150	2,130	1,300	4,640	13,830	470	14,300	3,570	3,720	7,290	21,590
	Total	27,780	320	2,060	3,130	33,290	2,310	150	3,260	5,080	10,800	30,090	470	30,560	5,320	8,210	13,530	44,090
Montana	First	5,110			530	5,640						5,110		5,110		530	530	5,640
	Second	2,610			20	2,630						2,610		2,610		20	20	2,630
	Other	400			350	750						400		400		350	350	750
	Total	8,120			900	9,020						8,120		8,120		900	900	9,020
Washington	First	120				120						120		120				120
	Second	1,380				1,380						1,380		1,380				1,380
	Other	1,830				1,830						1,830		1,830				1,830
	Total	3,330				3,330						3,330		3,330				3,330
Total	First	7,960			660	8,620	240		160	1,760	2,160	8,200		8,200	160	2,420	2,580	10,780
	Second	16,270		620	600	17,490	1,010		970	2,020	4,000	17,280		17,280	1,590	2,620	4,210	21,490
	Other	15,000	320	1,440	2,770	19,530	1,060	150	2,130	1,300	4,640	16,060	470	16,530	3,570	4,070	7,640	24,170
	Total	39,230	320	2,060	4,030	45,640	2,310	150	3,260	5,080	10,800	41,540	470	42,010	5,320	9,110	14,430	56,440

TABLE 5

SUMMARY OF RIBES ERADICATION, 1923-1950
INLAND EMPIRE

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Burn	1940-49	1,000	1,000	214,000	1.00	214	1,000	
	Plantation	1940-49	8,000	10,000	2,269,000	1.25	284	8,000	1,000
	Cutover	1940-49	23,000	24,000	8,019,000	1.04	349	23,000	161,000
	Cutover	1920-39	105,000	98,000	28,916,000	.93	275	100,000	236,000
	Reproduction	1910-39	609,000	688,000	183,620,000	1.13	302	525,000	114,000
	Pole		408,000	232,000	31,331,000	.57	77	393,000	85,000
	Mature		691,000	285,000	59,253,000	.41	86	492,000	227,000
	Miscellaneous		37,000	33,000	8,416,000	.89	227	30,000	13,000
	Stream		98,000	249,000	62,765,000	2.54	640	95,000	23,000
	Total		1,980,000	1,620,000	384,803,000	.82	194	1,667,000	860,000
Second	Plantation	1940-49	6,000	6,000	420,000	1.00	70	6,000	
	Cutover	1940-49	4,000	5,000	408,000	1.25	102	4,000	
	Cutover	1920-39	65,000	70,000	13,384,000	1.08	206	64,000	
	Reproduction	1910-39	215,000	253,000	23,064,000	1.18	107	204,000	
	Pole		145,000	89,000	8,097,000	.61	56	141,000	
	Mature		42,000	26,000	2,755,000	.62	66	36,000	
	Miscellaneous		5,000	6,000	917,000	1.20	183	4,000	
	Stream		55,000	85,000	10,515,000	1.55	191	55,000	
	Total		537,000	540,000	59,560,000	1.01	111	514,000	
Other	Plantation	1940-49	6,000	5,000	178,000	.83	30	6,000	
	Cutover	1940-49	1,000	1,000	49,000	1.00	49	1,000	
	Cutover	1920-39	39,000	39,000	2,204,000	1.00	57	37,000	
	Reproduction	1910-39	85,000	107,000	3,935,000	1.26	46	75,000	
	Pole		47,000	28,000	1,335,000	.60	28	38,000	
	Mature		8,000	7,000	671,000	.88	84	5,000	
	Miscellaneous		1,000	1,000	33,000	1.00	33	1,000	
	Stream		17,000	25,000	2,035,000	1.47	120	16,000	
	Total		204,000	213,000	10,440,000	1.04	51	179,000	
GRAND TOTAL			2,721,000	2,373,000	454,803,000	.87	167	2,360,000	

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	27,000	59,000	1,691,000
Second	11,000	16,000	292,000
Other	5,000	7,000	105,000
Total	43,000	82,000	2,088,000

TABLE 6

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1923-1950
INLAND EMPIRE

State	Class	Gross Acres	Effective Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Coop.	352,000	209,000	31,000,000	339,000	.59	88
	EQ-Emerg.	515,000	404,000	97,000,000	214,000	.78	188
	FS-Reg.	558,000	574,000	88,000,000	580,000	1.03	158
	FS-Emerg.	338,000	216,000	57,000,000	125,000	.64	169
	CCC	591,000	662,000	124,000,000	656,000	1.12	210
	Total	2,354,000	2,065,000	397,000,000	1,914,000	.88	169
Montana	EQ-Coop.	2,000	3,000	1,000,000	35,000	1.50	500
	EQ-Emerg.	66,000	31,000	6,000,000	1,000	.47	91
	FS-Reg.	59,000	70,000	6,000,000	67,000	1.19	102
	FS-Emerg.	36,000	36,000	7,000,000	22,000	1.00	194
	CCC	14,000	12,000	1,000,000	6,000	.86	71
	Total	177,000	152,000	21,000,000	131,000	.86	119
Washington	EQ-Emerg.	65,000	63,000	18,000,000		.97	277
	FS-Reg.	67,000	54,000	12,000,000	43,000	.81	179
	FS-Emerg.	36,000	14,000	4,000,000		.39	111
	CCC	22,000	25,000	3,000,000		1.14	136
	Total	190,000	156,000	37,000,000	43,000	.82	195
Total	EQ-Coop.	354,000	212,000	32,000,000	374,000	.60	90
	EQ-Emerg.	646,000	498,000	121,000,000	215,000	.77	187
	FS-Reg.	684,000	698,000	106,000,000	690,000	1.02	155
	FS-Emerg.	410,000	266,000	68,000,000	147,000	.65	166
	CCC	627,000	699,000	128,000,000	662,000	1.11	204
	Total	2,721,000	2,373,000	455,000,000	2,088,000	.87	167

Contract work included above:

Acres	Man-Days	Ribes
9,000	7,000	238,000

TABLE 7

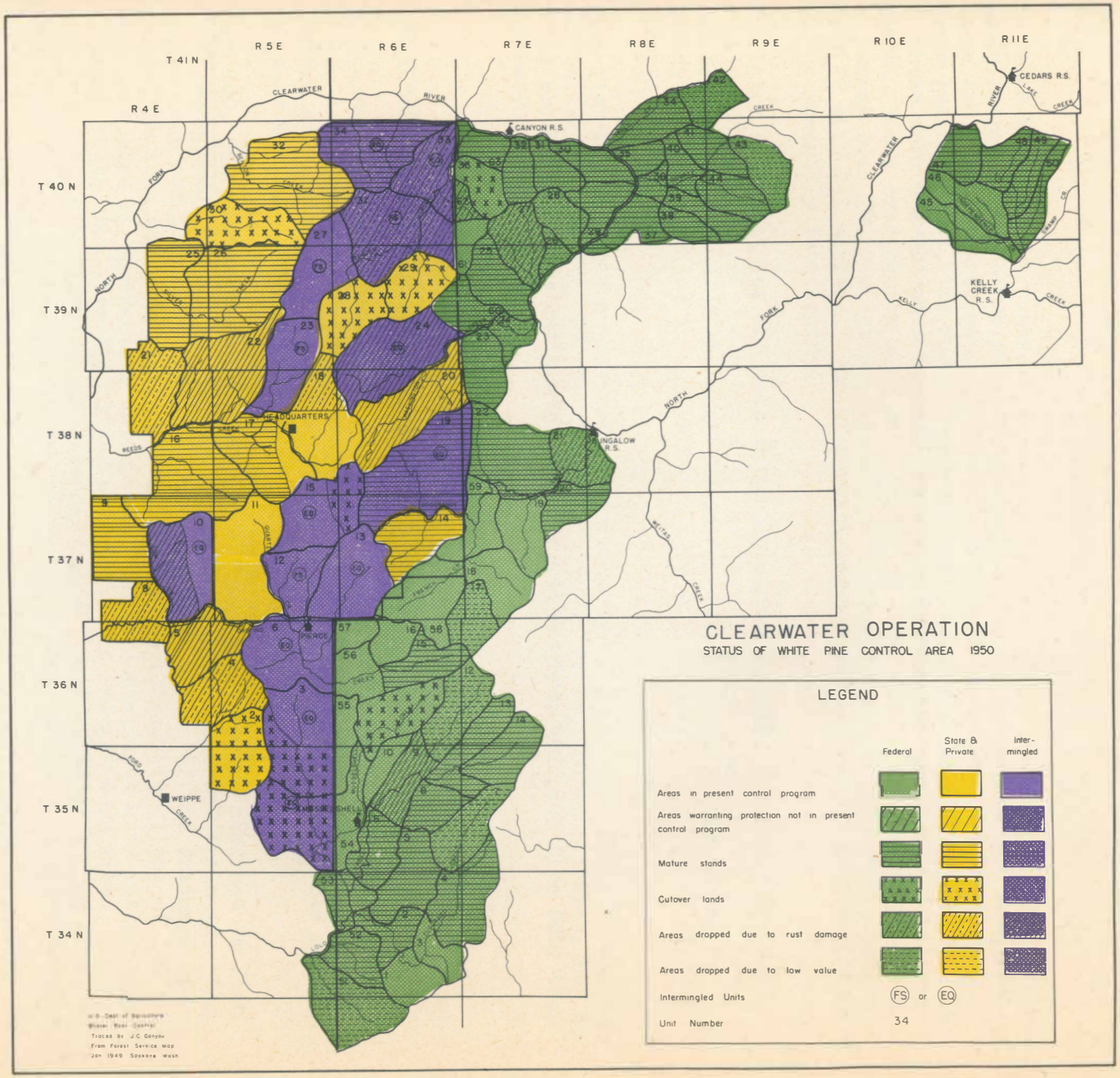
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1923-1950
INLAND EMPIRE

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Other	Total		
Idaho	National Forest	846,000	276,000	89,000	1,211,000	246,000	1,092,000
	Public Domain	14,000	6,000	3,000	23,000	15,000	29,000
	Subtotal Federal	860,000	282,000	92,000	1,234,000	261,000	1,121,000
	State	219,000	68,000	26,000	313,000	137,000	356,000
	Private	345,000	111,000	42,000	498,000	366,000	711,000
	Subtotal Other	564,000	179,000	68,000	811,000	503,000	1,067,000
	Total	1,424,000	461,000	160,000	2,045,000	764,000	2,188,000
Montana	National Forest	127,000	18,000	4,000	149,000	48,000	175,000
	State	1,000			1,000		1,000
	Private	18,000	2,000	2,000	22,000	14,000	32,000
	Subtotal Other	19,000	2,000	2,000	23,000	14,000	33,000
	Total	146,000	20,000	6,000	172,000	62,000	208,000
Washington	National Forest	90,000	31,000	12,000	133,000	30,000	120,000
	State	2,000			2,000		2,000
	Private	5,000	2,000	1,000	8,000	4,000	9,000
	Subtotal Other	7,000	2,000	1,000	10,000	4,000	11,000
	Total	97,000	33,000	13,000	143,000	34,000	131,000
Total	National Forest	1,063,000	325,000	105,000	1,493,000	324,000	1,387,000
	Public Domain	14,000	6,000	3,000	23,000	15,000	29,000
	Subtotal Federal	1,077,000	331,000	108,000	1,516,000	339,000	1,416,000
	State	222,000	68,000	26,000	316,000	137,000	359,000
	Private	368,000	115,000	45,000	528,000	384,000	752,000
	Subtotal Other	590,000	183,000	71,000	844,000	521,000	1,111,000
	Total	1,667,000	514,000	179,000	2,360,000	860,000	2,527,000

TABLE 8

RIBES SPECIES ERADICATED
INLAND EMPIRE

Working	Period	Gross Acres	Ribes Species								Total Ribes
			lacustre	viscosissimum	petiolare	inerme	irriguum	triste	coloradense	acerifolium	
First	1950	10,780	585,000	1,230,000	1,000						1,816,000
	1923-50	1,980,000	165,009,000	195,605,000	7,100,000	15,567,000	1,414,000	26,000	56,000	26,000	384,803,000
Second	1950	21,490	337,000	172,000	4,000	16,000					529,000
	1923-50	537,000	25,141,000	29,459,000	2,208,000	2,411,000	118,000	222,000	1,000		59,560,000
Other	1950	24,170	247,000	245,000	9,000	33,000					534,000
	1923-50	204,000	4,817,000	4,156,000	847,000	595,000	3,000	21,000	1,000		10,440,000
Total	1950	56,440	1,169,000	1,647,000	14,000	49,000					2,879,000
	1923-50	2,721,000	194,967,000	229,220,000	10,155,000	18,573,000	1,535,000	269,000	58,000	26,000	454,803,000


R5E
R6E
R7E
R8E
R9E
R10E
R11E
T41N
R4E
T40N
T39N
T38N
T37N
T36N
T35N
T34N
CLEARWATER
RIVER
CANYON R.S.
CEDARS R.S.
KELLY CREEK R.S.
HEADQUARTERS
BUNGALOW R.S.
PRINCE
WEIPPE
NORTH FORK
KELLY FORK
CLEARWATER RIVER
CLEARWATER OPERATION
STATUS OF WHITE PINE CONTROL AREA 1950
LEGEND
Federal
State & Private
Inter-mingled
Areas in present control program
Areas warranting protection not in present control program
Mature stands
Cutover lands
Areas dropped due to rust damage
Areas dropped due to low value
Intermingled Units
(FS) or (EQ)
Unit Number
34
U.S. Dept of Agriculture
Division Road Location
Traced by J.C. Gonyou
From Forest Service Map
Jan 1949 Spokane Wash

BLISTER RUST CONTROL, CLEARWATER OPERATION, 1950

By
M. C. Riley, Operation Supervisor
H. J. Faulkner, Assistant Operation Supervisor
B. C. Amsbaugh, Forest Officer

INTRODUCTION

The 1950 blister rust control program on the Clearwater operation included three camps operated by the Bureau of Entomology and Plant Quarantine and five regular camps and a small spray camp operated by the Forest Service. In addition to these regular crews, the Bureau awarded seven ribes eradication contracts. Six of these were awarded on a competitive bid basis and one was a negotiated contract. Ribes eradication work was started on June 6 and the last camp closed on August 30. The peak of employment for the entire operation was reached on June 28 with 316 workers. Forest Service camps were delayed in starting because of the unusually late spring.

The labor situation was the most favorable since the war. Workers were more stable and mature, and there was a higher percentage of experienced men than for some years. Most of the small amount of labor turn-over was caused by reservists being called to active duty. The 48-hour work week was in effect throughout the season.

Fire fighting duty did not interfere appreciably with the work. One Bureau camp was called on fire duty by the Clearwater Timber Protective Association, but no ribes eradication time was lost. Forest Service crews had less fire duty than for many years.

LOCATION AND DESCRIPTION OF AREAS

Cooperative Camps on State and Private Lands

Work areas were selected in the highest priority portions of the white pine stands as determined by the working unit analysis. In 1950, the camps were located at Blister Rust Headquarters and at Rhodes Creek in the Pierce unit and near C.T.P.A. Headquarters in the Reeds Creek unit.

Camp 100, BRC Headquarters, Unit 6. Work from this camp was confined to Flat Creek except for a small adjacent area in the Hildebrand Creek drainage. The entire area was logged in 1937. In the southwest corner of the drainage the protection zone was extended by initial work. An uncompleted block of 140 acres will be worked by contractors next year. Working conditions were rather severe although ribes were generally light except for the initial work area. A very high standard of efficiency was obtained. Additional coverage should be necessary only on the initial work area and in small isolated patches where suppressed ribes were found.

This work keeps on schedule the orderly progress of ribes eradication in the western portion of the important Pierce block. While the area was logged too recently to be placed on maintenance, the work meets maintenance standards and should be the last working for most of the ground.

Camp 110, Rhodes Creek, Unit 6. Crews from this camp completed work currently necessary on Orofino Creek from the National Forest boundary to Mutton Gulch. First working was done on St. Louis Gulch to complete the protection area near the forest boundary as well as to protect better adjacent stands. Second and third work was completed along Orofino Creek west of the mouth of Rhodes Creek. Working conditions were favorable on the north portion of the work area but were rather severe on the south side of Orofino Creek.

The area worked from this camp was logged within the last 10 years. The area receiving first coverage will need another working in 3 years. The remainder of the ground worked generally met protection standards but portions of the area must have a post check in 3 years before placing the area in a maintenance status.

Camp 111, Reeds Creek, Unit 18. The work area for this camp was on Reeds Creek west of the mouth of Deer Creek and at the north end of the high priority area on Deer Creek. The season's activity, which consisted of second and third working, was immediately adjacent to ground covered in the two previous years. Working conditions were more severe than normal and there was a wide variation in the number of ribes removed per acre. Over half of the area presents a suppressed bush problem.

None of the acreage worked this season can be placed on maintenance. Where there was no small bush problem the quality of the work was satisfactory but the ground has been too recently disturbed by logging. A post check will be needed in 1952 and another working on Reeds Creek should be performed in 1953.

Brown's Creek, Unit 3. In addition to the work done by regular crews, the Buffalo turbine blower was used in the head of Brown's Creek. This area was logged in the winter of 1947-48 and an excellent white pine seed source remains. A high percentage of the ribes which have germinated thus far are found along the numerous roads making an ideal situation for the application of chemical with power equipment. The north side of the road along the main ridge was treated with 2,4,5-T because this was affected by an older cutting. The remainder of the area was treated with 2,4-D. Each side of the 9.6 miles of road was treated from both directions. This resulted in applying 250 gallons of 2,4,5-T solution and 4,250 gallons of 2,4-D solution at an expenditure of 10 effective man-days for equipment operators.

Ribes Eradication by Contract, Units 6 and 18. Five contracts were awarded in Fromelt Creek totaling 260 acres and two contracts in Reeds Creek totaling 160 acres. These were all second working in very high priority areas. The contracts on Fromelt Creek rounded out work performed in the last two seasons from the BRC Headquarters camp. Those on Reeds Creek were an extension of the area worked this year by Camp 111 where the travel time would have been excessive for regular crews. All contracts were completed this season and a high quality of work was performed at less cost than with force account labor. Additional men evidenced an interest in contract work for next season which should make it possible to expand contractual procedure.

Powderhouse Area W-1998 Series

All merchantable trees cut in 1928. Pictures show growth in 12 years. Initial ribes eradication in 1933. Area, now on maintenance, will produce over 35 M.B.F. per acre at a total blister rust cost of $1.76 per M.B.F.

Forest Service Camps on Federal Lands

Camp 161, Preacher Gulch. Work was performed in three working units. Five hundred fifty-five acres were covered in the Preacher Gulch unit consisting mostly of reproduction and pole size stands. In the Powderhouse area, 2,077 acres of reproduction and pole size stands were worked. In the Rosebud Creek unit, 310 acres were worked.

In Preacher Gulch, many seedlings were encountered on cutover areas. Since much of this cutting resembles some of the later partially cut areas, there is a question as to how long seedlings will continue to germinate on this type of cutting. It was hoped that this working would complete the unit, but from present indications at least another working will be necessary on some of the area due to the continued appearance of these seedlings.

Camp 162, Alder Creek. Work was performed in both the Alder Creek and Beaver Creek units. In the Alder Creek area, 2,214 acres of reproduction, plantation and pole stands were covered. On the Beaver Creek area, 517 acres were worked principally in plantation and pole stands.

Some initial work was done in the Alder Creek drainage on areas which had been previously deferred due to the heavy working conditions. This work was essential for the protection of adjacent stands. Some reworking will probably be necessary within the next 5 years to insure protection of the stands in this unit.

In the Beaver Creek unit, new seedlings are appearing in the pole stands due to windthrow of some of the trees. While not a high cost ribes eradication job it does entail almost complete coverage of the area in order to locate the bushes. It is hoped that this unit can be completed next season and that no further work will be required to protect the existing stands.

Camp 163, Sylvan Saddle. The work area for this camp was in plantations that were established in 1939 and 1940 and on areas of natural white pine reproduction and pole stands. There were 1,009 acres worked which completed the hand eradication planned for this unit. An area needing broadcast spraying is all that remains to be worked in this unit. Periodic inspections will be required to determine if additional work is needed. Very little infection is present in this plantation and under normal conditions no further losses should occur.

Camp 164, Tamarack Ridge Camp. Crews from this camp worked in two units, blocking in the area between camps 163 and 165. Two hundred twelve acres were covered in the Sylvan Creek unit and 908 acres in the Lower French Creek-Orogrande unit. This 51- to 60-year-old, well stocked stand is one of the best on the forest. Most of the ribes found were along streams and in the alder glades which are numerous throughout the area. The check shows that a major portion of the ribes missed were seedlings. Periodic inspections will be required to determine what action will be necessary to maintain protection. Very little further work should be required unless the appearance of seedlings in this stand necessitates continued workings until the ribes potential has been eliminated.

Camp 165, Sylvan Creek Camp. In the Sylvan Creek unit, 929 acres of 51- to 60-year-old stands were worked. In the Lower French Creek-Orogrande unit, 853 acres were worked. Ribes were more generally distributed on this area although concentrations occurred, as at Camp 164, around alder glades and along streams. More regeneration of ribes occurred on this area due to "blow-down" and this demonstrates that there is a high ribes potential in stored seed generally over the whole area. Any operations that might open up the stand or create disturbance of the soil will cause the germination of many ribes. For this reason, any early partial cuts in the French Creek-Tamarack Creek block of units will need to be carefully controlled to avoid excessive costs of additional blister rust work.

Camp 166, Sheep Mountain Creek. Work here was exclusively power spraying on cutover lands. Due to the steepness of the roads, the trailer-mounted Hardie sprayer pulled with a D-4 tractor dozer was used. The importance of controlling the percent of grade on logging operations was clearly indicated as difficulty was experienced in getting the equipment into the steeper portions of the logging areas. This had some influence on increasing the costs. Conditions varied considerably but generally one of two conditions were found: on ridge tops, where excessive disturbance had occurred and the stand opened more than would be desired, up to several thousand ribes per acre were found. This condition made a complete coverage by broadcast spraying necessary. A second common condition was the occurrence of ribes along all roads, skidways and skidtrails for a distance of about one-half chain on each side. When sufficient canopy remained and there was little disturbance of the forest floor during logging, few if any ribes were found beyond this narrow limit along the roads. One small area in which a brush fire had spread supported numerous ribes. There is some indication that on partially cut areas the period of germination may be longer and therefore require additional working if the ribes populations are to be kept to a safe minimum. Since a difference of 4 years in time of cutting occurred on the area, information is needed as to the best method of handling these partially cut areas.

METHODS AND EQUIPMENT

No organized training schools were held because supervisors were needed to get camps built prior to the arrival of crews or they were not available until their crews reported. All supervisors and checkers were given individual training and instruction. All crewmen were given intensive training, both by use of charts and in actual practice, in ribes eradication techniques and safety measures.

The hormone spray 2,4,5-T was used to supplement hand work wherever it was more economical. It was also used in the power spraying equipment on the operation. The Buffalo turbine blower was used experimentally in addition to the work previously mentioned. Some roadsides with satisfactory gradient on the Sheep Mountain sale area were treated by the blower and also 2.5 miles of road were treated on Association lands on Breakfast Creek to study the efficiency of the method on old ribes bushes. In the vicinity of Hemlock Mountain, the blower was tested on roadside brush.

A study under the guidance and supervision of the methods development and improvement project was conducted to test various dosages and concentrations of 2,4,5-T in broadcast application on bushes 1 to 10 years of age. Various nozzles and disc orifices were also tested. A Bean power sprayer with all hose equipped with Hansen fittings was used in the work. A foreman and two spray men were supplied by the Clearwater operation.

An experiment to test the practicability in blister rust control of the Renshaw recognition system using a tachistoscope was conducted at Camp 100. Twelve crewmen were selected and given a course of 30 sessions in recognition work which included some ribes slides. The work of these men in the field was compared with a like number of workers who did not receive the tachistoscopic training. The results and conclusions of this study will be reported separately.

CHECKING

Five Bureau and seven Forest Service checkers were employed this season to handle regular and post checking. The Bureau checkers were supervised by the assistant operation supervisor and the Forest Service checkers were under the supervision of a checker foreman employed by the Forest Service. Bureau checkers also laid lane and lot lines and two Forest Service checkers spent approximately half their time on disease survey. Permanent Bureau personnel handled all surveying and checking on the seven Bureau contract areas.

The 14,560 acres on which ribes eradication was performed were checked by the standard meandering traverse method. Two thousand acres were post checked by the parallel strip method.

A checking method study was conducted to evaluate the accuracy and adequacy of the regular check following the lot method of ribes eradication on upland areas. This involved an area of 100 acres of light ribes on Flat Creek. The final analysis and results will be reported at a later date.

WHITE PINE STOCKING AND DISEASE SURVEY

Survey activities were mainly on lands of the Clearwater Timber Protective Association where high priority units were practically completed. One-man crews were used, at a considerable saving, since no tree climbing was necessary. Aside from a small area in the upper Alder Creek drainage, high priority areas on National Forest units had been completed previously. Resurveys on both Association and National Forest lands will be necessary at intervals of several years to keep the data current.

Surveys were made in the following units during the 1950 season:

Clearwater Timber Protective Association		National Forest	
Unit No.		Unit No.	
6	Hildebrand	23	Alder Creek
11	Jaype-Hollywood	27	Camp 6
15	Cardiff		
17	Calhoun Creek		
18	Deer Creek		

Results show that during the past 10 years 1941, 1944, and 1946 have been outstanding in the development, spread, and resultant damage from blister rust. If wave years have occurred since 1946, they will be revealed by future surveys.

In general, the results of the surveys have not materially changed the area classifications within the working units. In a few cases where areas had been degraded due to heavy rust losses, data show that the areas where adequate seed source remained are again restocking to white pine. Where an adequate white pine seed source was lacking, mixed species are replacing the white pine lost to blister rust and future volumes of white pine will be light.

CONTROL STATUS

Improved methods and techniques have barely permitted keeping pace with the reduced program of recent years and there has been no opportunity to initiate control work on recently logged areas outside a few selected units. It has been necessary to concentrate blister rust control work on eight units comprising 46,000 acres, an area less than 40 percent of the high priority Association lands. However, on lands within the scope of the present program, there is a potential white pine yield of approximately 795 million board feet. Analysis of these areas shows the total cost of protection from blister rust is from $1 to $3 per thousand board feet. The drainages outside the eight units which have been recently logged and those to be logged in the near future cannot be given any blister rust protection under the present program.

A better understanding of control problems is being evidence by operators and decisions on cutting practices are being properly influenced by a realization of these problems.

On lands of the Clearwater National Forest, an orderly and adequate program is planned for the best areas selected in the working unit analysis. Control programs of recent years have kept workings on schedule and cutting practices are being followed with a view to limiting ribes regeneration. A large percentage of the area worked by Forest Service crews this season, except on recent sale areas, was in reproduction and pole stands where conditions are stabilized and the areas can now be placed on a maintenance basis. There is a total of 90,450 acres on maintenance on the Clearwater operation. Because of cuttings and as a result of surveys, 1,800 acres were removed from this category, and as a result of the 1950 eradication and checking work, 4,350 were placed on maintenance.

RESULTS

The following tables show statements of expenditures, results of the 1950 field work, and accumulative results of work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1950
CLEARWATER OPERATION

Item	Bureau of Entomology & Plant Quarantine					Forest Service	
		Cooperative Control					
	BLR-1-4	Federal BLR-3-4	State & Private	Total	Total	BLR-4	Total
Salary perm. men	$11,378	$ 1,571		$ 1,571	$12,949	$ 39,846	$ 52,795
Salary temp. men	224	6,229	$ 3,163	9,392	9,616	15,184	24,800
Wages temp. laborers	848	22,059	13,658	35,717	36,565	78,683	115,248
Contract ribes erad.		4,224	809	5,033	5,033		5,033
Subsistence supplies	9	6,572		6,572	6,581	31,515	38,096
Chemicals	584				584	2,081	2,665
Equipment						11,715	11,715
Travel and transp.	560	827		827	1,387	4,289	5,676
Other expenses	1,145	909		909	2,054	5,998	8,052
Total	$14,748	$42,391	$17,630	$60,021	$74,769	$189,311*	$264,080

*Total includes $5,292 K-V funds ($4,281 wages, $1,011 subsistence).

TABLE 2

SUMMARY OF RIBES ERADICATION, 1950
CLEARWATER OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Cutover	1940-49	1,840	460	792,000	.25	430
	Cutover	1920-39	130	150	10,000	1.15	77
	Reproduction	1910-39	10	10	1,000	1.00	100
	Mature		60	150	10,000	2.50	167
	Total		2,040	770	813,000	.38	399
Second	Cutover	1940-49	280	370	15,000	1.32	54
	Cutover	1920-39	1,820	1,540	49,000	.85	27
	Reproduction	1910-39	160	40	10,000	.25	63
	Pole		1,300	700	35,000	.54	27
	Mature		60	20	1,000	.33	17
	Stream		20	30	1,000	1.50	50
	Total		3,640	2,700	111,000	.74	30
Other	Plantation	1940-49	270	150	3,000	.56	11
	Cutover	1940-49	380	310	12,000	.82	32
	Cutover	1920-39	680	640	16,000	.94	24
	Reproduction	1910-39	2,450	1,320	15,000	.54	6
	Pole		4,450	2,100	55,000	.47	12
	Mature		630	300	18,000	.48	29
	Stream		20	10	1,000	.50	50
	Total		8,880	4,830	120,000	.54	14
GRAND TOTAL			14,560	8,300	1,044,000	.57	72

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	1,590	220	19,990
Second	20	30	610
Other	20	10	320
Total	1,630	260	20,920

TABLE 3

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1950
CLEARWATER OPERATION

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
							Man-Days	Ribes
Idaho	First	EQ-Coop.	420	400	46,000	4,610	.95	110
		FS-Reg.	1,620	370	767,000	15,380	.23	473
		Total	2,040	770	813,000	19,990	.38	399
	Second	EQ-Coop.	1,600	1,540	40,000	610	.96	25
		EQ-Cont.	420	270	20,000		.64	48
		FS-Reg.	1,620	890	51,000		.55	31
		Total	3,640	2,700	111,000	610	.74	30
	Other	EQ-Coop.	990	930	27,000		.94	27
		FS-Reg.	7,890	3,900	93,000	320	.49	12
		Total	8,880	4,830	120,000	320	.54	14
	All Workings	EQ-Coop.	3,010	2,870	113,000	5,220	.95	38
		EQ-Cont.	420	270	20,000		.64	48
		FS-Reg.	11,130	5,160	911,000	15,700	.46	82
		Total	14,560	8,300	1,044,000	20,920	.57	72

TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1950
CLEARWATER OPERATION

State	Working	Acres Worked											
		By Forest Service				By Bureau of Entomology and Plant Quarantine			Total Federal				GRAND TOTAL
		National Forest	State	Private	Total	State	Private	Total	National Forest	Total Other State	Total Other Private	Total Other Total	
Idaho	First	1,620			1,620	70	350	420	1,620	70	350	420	2,040
	Second	1,580	40		1,620	790	1,230	2,020	1,580	830	1,230	2,060	3,640
	Other	5,010	1,220	1,660	7,890	400	590	990	5,010	1,620	2,250	3,870	8,880
	Total	8,210	1,260	1,660	11,130	1,260	2,170	3,430	8,210	2,520	3,830	6,350	14,560

TABLE 5

SUMMARY OF RIBES ERADICATION, 1929-1950
CLEARWATER OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Plantation	1940-49	340	770	164,000	2.26	482	340	
	Cutover	1940-49	13,120	13,980	6,327,000	1.07	482	13,110	38,100
	Cutover	1920-39	39,270	40,450	13,670,000	1.03	348	35,450	29,730
	Reproduction	1910-39	72,000	109,110	33,470,000	1.52	465	70,790	3,570
	Pole		31,500	18,420	3,878,000	.58	123	29,850	4,760
	Mature		219,360	100,040	23,432,000	.46	107	150,930	42,100
	Miscellaneous		5,850	3,900	1,701,000	.67	291	5,420	7,820
	Stream		42,540	78,390	14,099,000	1.84	331	42,540	13,490
	Total		423,980	365,060	96,741,000	.86	228	348,430	139,570
Second	Plantation	1940-49	260	480	35,000	1.85	135	260	
	Cutover	1940-49	2,140	3,620	364,000	1.69	170	2,140	
	Cutover	1920-39	33,090	31,850	8,306,000	.96	251	33,090	
	Reproduction	1910-39	27,040	42,130	3,802,000	1.56	141	26,960	
	Pole		22,380	12,000	1,282,000	.54	57	21,750	
	Mature		16,390	8,000	816,000	.49	50	14,230	
	Miscellaneous		510	570	371,000	1.12	727	510	
	Stream		23,830	27,110	3,334,000	1.14	140	23,830	
	Total		125,640	125,760	18,310,000	1.00	146	122,770	
Other	Plantation	1940-49	450	290	7,000	.64	16	450	
	Cutover	1940-49	530	410	19,000	.77	36	530	
	Cutover	1920-39	17,240	16,370	1,158,000	.95	67	17,240	
	Reproduction	1910-39	10,760	12,130	491,000	1.13	46	10,760	
	Pole		12,310	6,490	151,000	.53	12	12,310	
	Mature		1,170	340	19,000	.29	16	1,170	
	Stream		3,570	4,080	414,000	1.14	116	3,570	
	Total		46,030	40,110	2,259,000	.87	49	46,030	
	GRAND TOTAL		595,650	530,930	117,310,000	.89	197	517,230	

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	17,270	32,200	862,000
Second	6,000	8,380	130,000
Other	950	1,560	26,000
Total	24,220	42,140	1,018,000

TABLE 6

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1929-1950
CLEARWATER OPERATION

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Coop.	69,000	65,520	9,093,000	254,000	.95	132
	EQ-Cont.	460	340	23,000		.74	50
	EQ-Emerg.	133,970	125,280	30,398,000	137,000	.94	227
	FS-Reg.	148,830	128,540	30,659,000	195,000	.86	206
	FS-Emerg.	55,910	45,380	14,895,000	24,000	.81	266
	CCC	187,480	165,870	32,242,000	408,000	.88	172
	Total	595,650	530,930	117,310,000	1,018,000	.89	197

TABLE 7

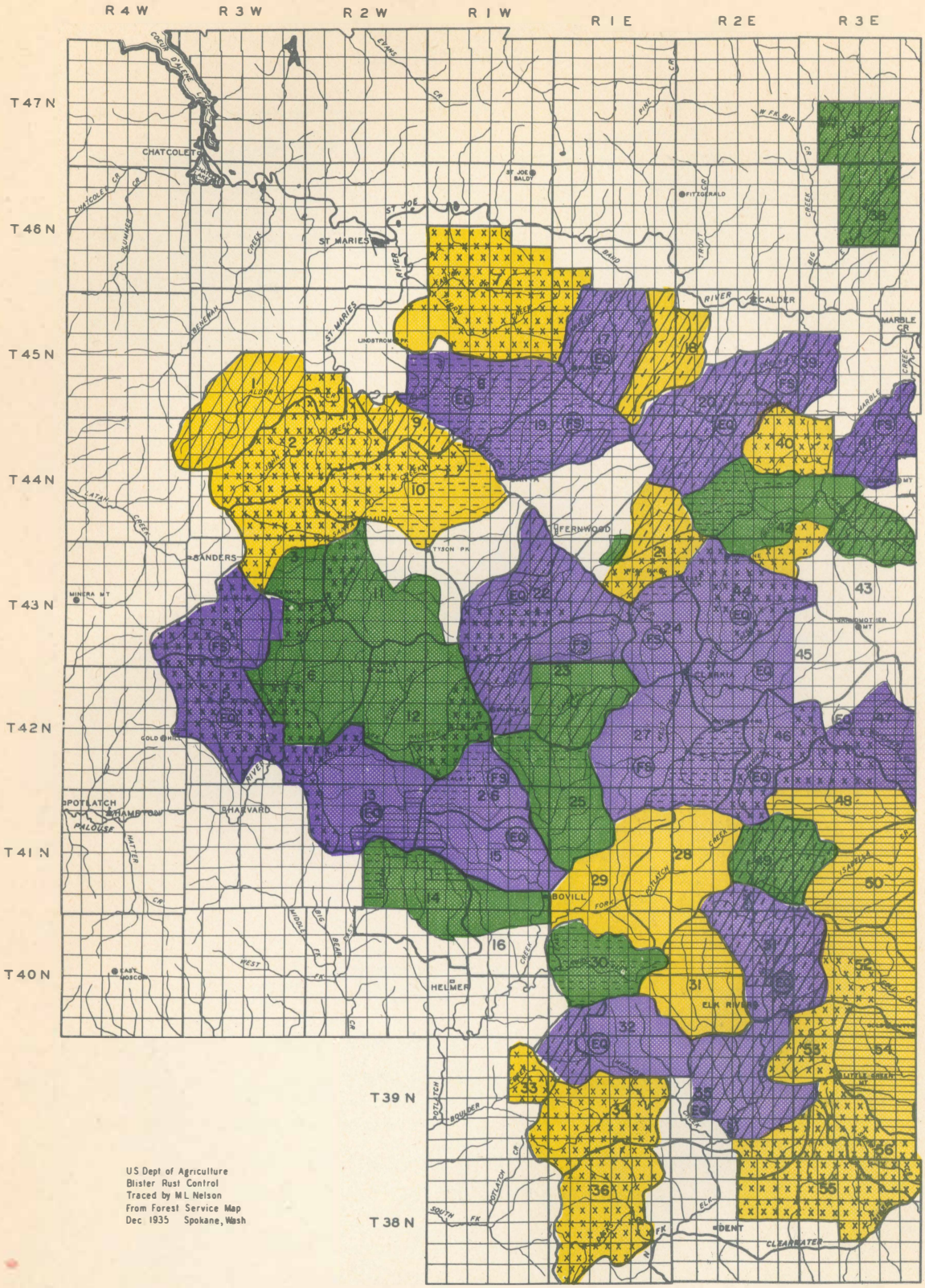
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1929-1950
CLEARWATER OPERATION

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Other	Total		
Idaho	National Forest	153,470	60,390	21,950	235,810	46,880	200,350
	Public Domain	3,640	710	50	4,400	400	4,040
	Subtotal Federal	157,110	61,100	22,000	240,210	47,280	204,390
	State	57,740	15,780	4,370	77,890	32,510	90,250
	Private	133,580	45,890	19,660	199,130	59,780	193,360
	Subtotal Other	191,320	61,670	24,030	277,020	92,290	283,610
	Total	348,430	122,770	46,030	517,230	139,570	488,000

TABLE 8

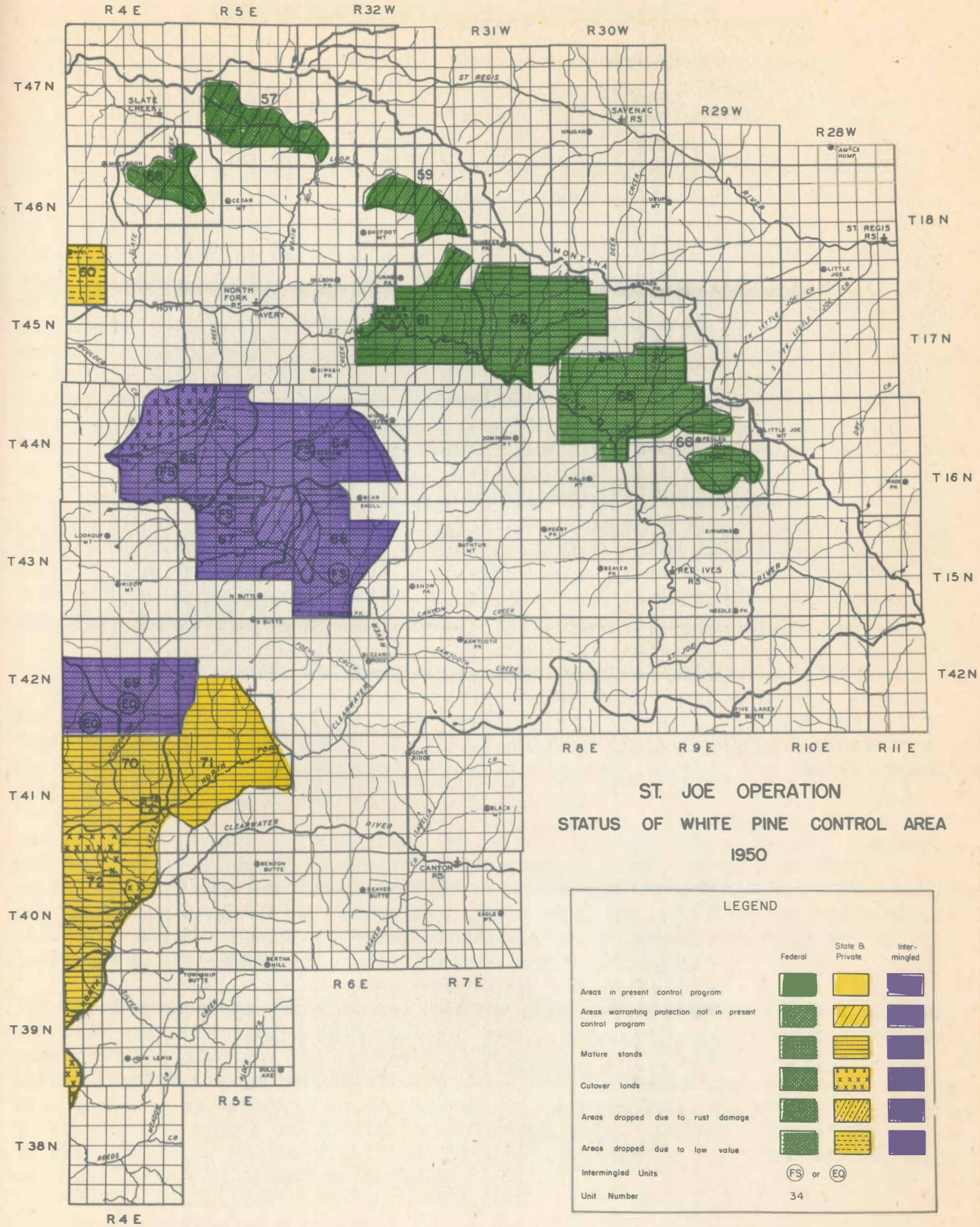
RIBES SPECIES ERADICATED
CLEARWATER OPERATION

Working	Period	Gross Acres	Ribes Species						Total Ribes
			lacustre	viscosissimum	petiolare	inerme	irriguum	triste	
First	1950	2,040	117,000	696,000					813,000
	1929-50	423,980	40,205,000	52,153,000	3,248,000	886,000	249,000		96,741,000
Second	1950	3,640	41,000	67,000	3,000				111,000
	1929-50	125,640	5,441,000	11,801,000	962,000	77,000	22,000	7,000	18,310,000
Other	1950	8,880	50,000	65,000	5,000				120,000
	1929-50	46,030	749,000	1,290,000	197,000	23,000			2,259,000
Total	1950	14,560	208,000	828,000	8,000				1,044,000
	1929-50	595,650	46,395,000	65,244,000	4,407,000	986,000	271,000	7,000	117,310,000



US Dept of Agriculture
Blister Rust Control
Traced by M.L. Nelson
From Forest Service Map
Dec 1935 Spokane, Wash

H. J. HARTMAN
ANNUAL REPORT 1950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R5E
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R31W
R30W
R29W
R28W
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T46N
T45N
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T40N
T39N
T38N
T18N
T17N
T16N
T15N
T42N
R8E
R9E
R10E
R11E
R6E
R7E
R5E
R4E
ST. JOE OPERATION
STATUS OF WHITE PINE CONTROL AREA
1950
LEGEND
Federal
State & Private
Inter-mingled
Areas in present control program
Areas worronting protection not in present control program
Mature stands
Cutover lands
Areas dropped due to rust damage
Areas dropped due to low value
Intermingled Units
(FS) or (EQ)
Unit Number
34
H. J. HARTMAN
ANNUAL REPORT 1950

BLISTER RUST CONTROL, ST. JOE OPERATION, 1950

By

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INTRODUCTION

Blister rust control was continued on the St. Joe operation for the 22nd consecutive year. During the last 12 years only a fraction of the funds required to manage the complete control program was available. During this period nearly all control work was confined to the protection of the better stands of immature white pine which will produce the greatest return per dollar invested. In 1949, a complete analysis of all working units was made and a program established consistent with available funds. Under this program, the Forest Service has selected 18 working units containing 139,000 acres. The Bureau program on state, private, and intermingled federal lands has 7 working units containing 59,000 acres. An additional 60,000 acres of good quality immature stands have been deferred until adequate funds are available. All work has been deferred on 188,000 acres of mature stands and 206,000 acres of cutover lands. Eighty-eight thousand acres of heavily infected immature white pine stands and 95,000 acres of low valued pine stands have been dropped from the control program. Most of the low value acreage had never been worked. See accompanying map for details.

Over the last few years substantial progress has been made in coordinating blister rust control with timber management planning and practices. It includes the selection of the areas where white pine will be grown and protected and the application of cutting methods or silvicultural treatments which will reduce the ribes eradication problem and provide the highest possible yield of white pine.

The Bureau of Entomology and Plant Quarantine operated three camps. One camp was located on lands of intermingled ownership in the vicinity of Clarkia, Idaho. Two 50-man camps were located on state and private lands in the Cameron and East Fork of Potlatch drainages. The Forest Service financed and administered six camps on National Forest lands on Bear, Corral, Charlie, and Bussel Creeks plus a sizable ribes eradication contract program.

The first camp opened in late May and the last camp closed in early September. The work season averaged 2½ months per camp. A large majority of the workers was college students. During the last 2 years a satisfactory labor supply existed for the short period of June 8 to 20. All camps must be manned during this period. At the peak of employment, there were 290 employees in the 6 Forest Service camps and 110 in the 3 Bureau camps. Man-days lost from blister rust work due to fire fighting duty were negligible. The 48-hour work week policy was continued as in 1949.

LOCATION AND DESCRIPTION OF AREAS

All control work was concentrated on the following high priority units:

Cooperative Camps on State and Private Lands

Bobs Creek, Unit No. 29. Open reproduction totaling 5,800 acres, recent cutover of 4,000 acres, and 3,200 acres of uncut mature comprise the 13,000 acres of this unit. All recent cuttings are of the seed-source type. Sixty percent of the volume was removed in the initial cut. The residual stand will be harvested as soon as white pine reproduction has become well established. Close cooperation is being maintained with the operators. The 1,340 acres worked by Bureau crews in 1950 averaged 1.46 man-days and 290 ribes per acre. Portions of the work area supporting heavy concentrations of ribes were treated with 2,4,5-T chemical by means of a power sprayer. The area lends itself well to the use of power sprayers and turbine blowers. Work will be continued in 1951. The use of power spray equipment will be greatly expanded.

Cameron Creek, Unit No. 31. There are 7,500 acres of immature and 5,000 acres of mature white pine in this unit. Most of the land now supporting the immature stands was logged and broadcast burned between 1911 and 1921. The young stands have been worked twice and some for the third time. Over 50 percent of the area is now on maintenance. One 330-acre block recently cut over was initially worked in 1950 in order to eliminate an infection hazard to the adjoining young white pine stands. This work averaged 1.36 man-days and 220 ribes per acre. The 800 acres worked for the third time averaged .87 man-day and 5 ribes per acre. A total of 1,660 acres was worked by Bureau crews in 1950. One camp will complete the work on this unit in 1951.

Gold Center, Unit No. 45. This unit contains 8,500 acres of immature stands most of which is pole size. The immature stands have been worked twice and a small portion for the third time. The third working was required at this time because of heavy snow damage in the winter of 1942-43, which disturbance caused light ribes germination. In 1950 a five-man Bureau crew worked 1,820 acres by the flanking method. The worked area averaged .13 man-day and 4 ribes per acre. This work will be continued in 1951.

Forest Service Camps on Federal Lands

Charlie Creek, Unit No. 11. White pine pole, reproduction, and plantations cover 7,680 acres in this unit. All of the area has been worked twice and some portions for the third time. Thirty-five percent of the area has been worked to maintenance standards. In 1950 initial stream and upland work was performed to extend the northern protection zone. Most of the man-days were spent reworking stream type and small blocks of upland. The 2,100 acres worked by Forest Service crews averaged .76 man-day and 39 ribes per acre. The remaining 1,000 acres presently requiring rework will be completed by contract in 1951.

In the fall of 1948, 280 acres of unworked brushland on Preston Knob were prepared for broadcast burning to eliminate an infection hazard to the Charlie Creek plantation. A satisfactory burn was accomplished in 1949 on half the area. The unburned portion was treated with 2,4,5-T by a helicopter in late June 1950. It was hoped that enough brush would be killed to secure a good broadcast burn

W-789

140-year-old western white pine stand following seed-source cutting on East Fork of Potlatch Creek. Original volume was 50,000 bd. ft. per acre. Residual stand will be harvested in about 15 years when white pine reproduction has become established. Ribes regeneration and growth occur wherever mineral soil has been disturbed.

by late August. The north slope remained damp and a satisfactory burn was attained on slightly over half the sprayed area. The burning will be completed in 1951 and the area planted in 1952.

Corral Creek, Unit No. 14. Practically all of this unit was selectively logged or clear-cut and broadcast burned in the early twenties. The present stand is a mixed age class. The clear-cut and broadcast burned areas now support a good stand of white pine reproduction. This area was initially worked in 1936. In 1950, 3,856 acres of the 6,400 acres in the unit were worked for the second time by crews of two Forest Service camps. The area worked averaged .75 man-day and 9 ribes per acre. No ribes seedlings were found on the area. One Forest Service camp will complete the work on this unit in 1951.

Bussel Creek, Unit No. 42. This unit supports 7,200 acres of white pine open reproduction and pole. The drainage was clear-cut and broadcast burned between 1920 and 1931. The worked area was burned over in 1922 in advance of logging. The area has been worked three times and portions of it the fourth time. This drainage has been the most difficult on which to attain permanent ribes suppression. The probable reasons for the prolonged ribes germination are the general high water table with many seepages and damp slopes, the nature and timing of the fires, and the slowness with which the stand is closing in. Ribes lacustre seedlings are still occurring on these areas. In 1950, the crews from three Forest Service camps worked 2,910 acres which averaged 1.42 man-days and 21 ribes per acre. Three Forest Service camps will complete the presently required work on this unit in 1951.

Contract Work. All contract work was confined to the Ramskull, Charlie, and Hatton Creek drainages. The Forest Service awarded 16 ribes eradication contracts totaling 1,107 acres. Work was completed on 520 of these acres during 1950. The remaining 587 acres under contract will be completed in 1951. The average bid price was $23.60 per acre for a total cost of $26,121.37. The contract areas represented very difficult working conditions and averaged 13 ribes and .92 man-day per acre.

Most of the contractors earned more than the prevailing blister rust control wage. Two of the contractors made less than the prevailing wage due to poor management plus their inability to properly evaluate ribes eradication working conditions. Contract work will be expanded in 1951. Areas totaling 1,000 acres have been surveyed for Forest Service contract work and are to be advertised early in 1951.

METHODS AND EQUIPMENT

The one-man dragline method of ribes eradication was used in all camps with a straw boss for each six to eight men.

Ninety acres of heavy concentrations of ribes on streams and recently logged areas were treated with 2,4,5-T. A Bean power sprayer and knapsack sprayers were used to apply the chemical. Cutover areas were broadcast sprayed at the rate of two-thirds of an acre per man-day when Pecan spray guns were used in conjunction with a Bean power sprayer. The chemical solution was applied at the rate of 460 gallons per acre.

Ammonium sulfamate was used extensively by all camps for ribes decapitation work.

A Buffalo turbine blower was used to spray 14 miles of roadside brush and ribes. Six miles of roadside were treated with 2,4,5-T and eight miles were treated with 2,4-D. Chemical solution was applied at the rate of 500 gallons per mile of road. The turbine blower was towed at the rate of 2 miles per hour. Each side of the road was given two applications; the second treatment was made while traveling the opposite direction. Treatment of this type made it possible to obtain a more complete coverage and maximum width of treated area. Where 2,4,5-T was used, a good kill was attained on mature Ribes lacustre and R. viscosissimum.

CHECKING

Supervision and training of checking personnel were under the direction of the assistant operation supervisor. The 15 checkers employed on the operation represented a total of 74 seasons of ribes eradication and checking experience. Seasons of experience varied from two to seven with only four of the checkers having less than five years. With this background of training and experience the efficiency of all checking personnel was at a very high level.

The standard checking procedure was applied to all areas inspected. Two checkers worked together when inspecting post check and maintenance areas. One man ran compass and searched for ribes along the strip. The other checker searched for ribes on a meandering course on either side of the compassman. While checking some maintenance areas, two checkers were assigned to work with the compassman.

A total of 29,400 acres was checked, 10,200 acres were 1950 work areas, and 19,200 acres were inspections of post check and maintenance areas. An analysis of checking activities indicated that 85 percent of each checker's time was given to regular and post check. The remaining 15 percent was spent on other blister rust control activities.

SURVEYS

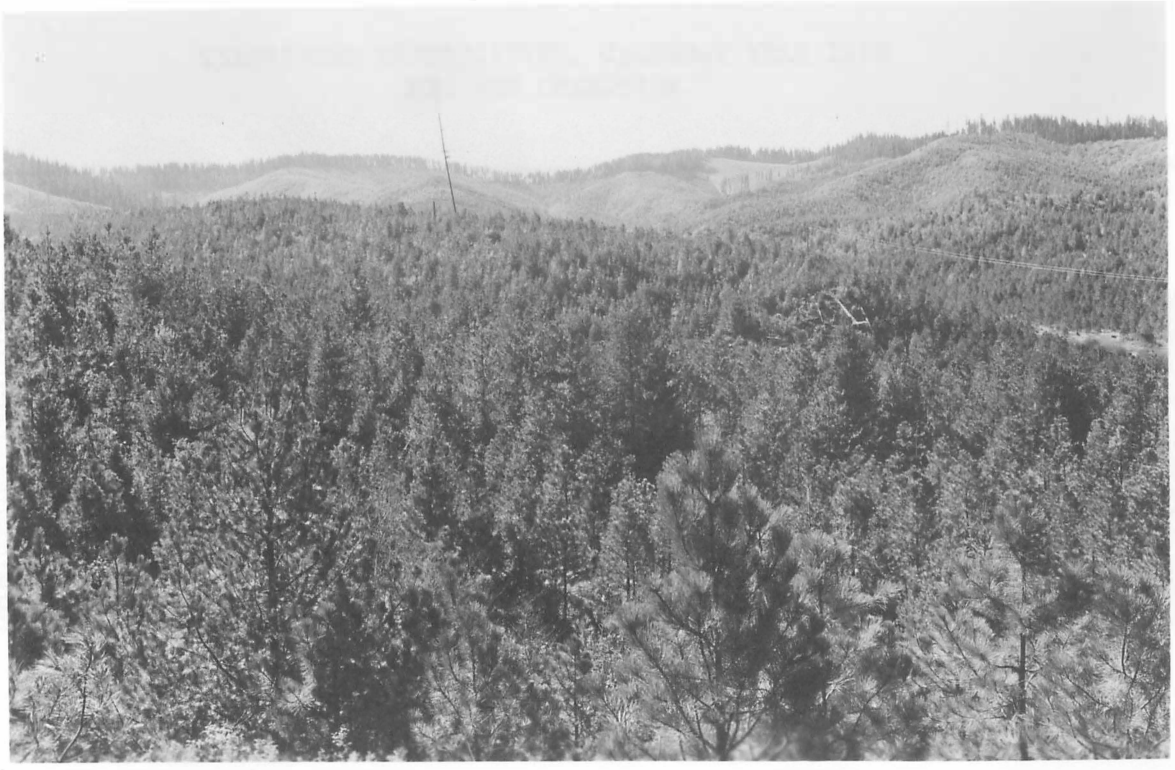
White Pine Stocking and Disease Survey. The survey to determine blister rust damage and stocking in pole and reproduction stands of western white pine was continued to gain additional data for unit analysis. Most of the survey was confined to questionable units and the intensification of the survey on high priority units. Five men worked on the survey throughout the 1950 field season. The project was financed from Forest Service funds and a forest officer was chief of party. The 177 miles of strip were run at the rate of 59 chains per man-day. Areas in 13 of the 72 units on the operation were examined.

The general blister rust infection picture for the operation has changed little from that reported in 1949. Stocking-damage surveys and field observations in unprotected stands indicate that 1947 was more than a normal blister rust wave year. It appears to be the most severe since 1941. Some damage is now occurring in 120- to 140-year-old stands that have been exposed to blister rust infection for a long period of time. While this damage is not at present extensive, the fact that it is taking place must be taken into consideration in the management of all unprotected mature stands.

Pole Blight Areas. The Division of Forest Pathology conducted a rather intensive aerial and ground pole blight survey of the St. Joe operation in 1950. From estimates made by the survey crews, moderate to severe pole blight damage is now known to occur on 12,600 acres of the white pine forests of the operation. Nine hundred acres of this affected area are inside the present blister rust control program.

W-2567

Ramskull Creek near Emida, Idaho, in 1938. Logged in 1928 and 1929. Slash burned in 1930. Snag felling and second broadcast burn completed by CCC in 1936. Planted in 1937 and 1938. Ribes eradication started in 1938.



W-2567-1

The above area in 1950, 12 years after planting.

CONTROL STATUS

Every possible effort is being made to place all areas within the present program on maintenance.

The logging of isolated patches of mature timber by small operators has in several cases created an infection hazard on areas previously worked to maintenance standards. Such logging operations cause abundant germination and growth of ribes. These ribes must be immediately eradicated in order to protect adjacent stands of white pine pole and reproduction.

During the 1950 field season, 11,200 acres of immature stands on maintenance were examined by the checkers. Of this acreage, 8,100 acres remained on maintenance and 3,100 acres reverted to rework status.

As a result of 1950 ribes eradication and post check work, 2,500 acres were placed on maintenance. The 520 acres worked by contract were placed on maintenance. There were 2,300 acres of maintenance which reverted to a rework status as a result of logging operations. A total of 161,500 acres is now on maintenance on the operation.

RESULTS

The following tables show statements of expenditures, results of the 1950 field work, and accumulative results of work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1950
ST. JOE OPERATION

Item	Bureau of Entomology & Plant Quarantine					Forest Service	
		Cooperative Control					
	BLR-1-4	Federal BLR-3-4	State & Private	Total	Total	BLR-4	Total
Salary perm. men	$20,080	$ 1,874		$ 1,874	$21,954	$ 32,947	$ 54,901
Salary temp. men	251	4,215	$ 1,127	5,342	5,593		5,593
Wages temp. laborers	1,324	24,886	16,400	41,286	42,610	132,100	174,710
Contract ribes erad.						12,540	12,540
Subsistence supplies	1,632	8,733		8,733	10,365	39,200	49,565
Chemical	737				737	2,125	2,862
Equipment						14,600	14,600
Travel and transp.	900	1,003		1,003	1,903	8,808	10,711
Other expenses	1,685	1,088		1,088	2,773	8,980	11,753
Total	$26,609	$41,799	$17,527	$59,326	$85,935	$251,300	$337,235

TABLE 2

SUMMARY OF RIBES ERADICATION, 1950
ST. JOE OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Cutover	1940-49	1,200	1,680	427,000	1.40	356
	Reproduction	1910-39	80	190	16,000	2.38	200
	Pole		70	40	5,000	.57	71
	Stream		50	50	25,000	1.00	500
	Total		1,400	1,960	473,000	1.40	338
Second	Plantation	1940-49	70	20	1,000	.29	14
	Cutover	1940-49	120	220	8,000	1.83	67
	Cutover	1920-39	490	210	2,000	.43	4
	Reproduction	1910-39	3,670	3,390	68,000	.92	19
	Pole		320	120	3,000	.38	9
	Stream		100	90	1,000	.90	10
	Total		4,770	4,050	83,000	.85	17
Other	Plantation	1940-49	290	190	2,000	.66	7
	Cutover	1920-39	1,030	1,490	15,000	1.45	15
	Reproduction	1910-49	3,440	3,990	47,000	1.16	14
	Pole		2,530	740	13,000	.29	5
	Mature		140	90	1,000	.64	7
	Stream		610	590	21,000	.97	34
	Total		8,040	7,090	99,000	.88	12
GRAND TOTAL			14,210	13,100	655,000	.92	46

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	50	130	19,450
Other	40	30	400
Total	90	160	19,850

TABLE 3

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1950
ST. JOE OPERATION

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
							Man-Days	Ribes
Idaho	First	EQ-Coop.	1,190	1,660	423,000	17,500	1.39	355
		FS-Reg.	210	300	50,000	1,950	1.43	238
		Total	1,400	1,960	473,000	19,450	1.40	338
	Second	EQ-Coop.	610	920	34,000		1.51	56
		FS-Reg.	4,160	3,130	49,000		.75	12
		Total	4,770	4,050	83,000		.85	17
	Other	EQ-Coop.	3,020	1,440	13,000	170	.48	4
		FS-Reg.	4,500	5,170	79,000	230	1.15	18
		FS-Cont.	520	480	7,000		.92	13
		Total	8,040	7,090	99,000	400	.88	12
	All Workings	EQ-Coop.	4,820	4,020	470,000	17,670	.83	98
		FS-Reg.	8,870	8,600	178,000	2,180	.97	20
		FS-Cont.	520	480	7,000		.92	13
		Total	14,210	13,100	655,000	19,850	.92	46

TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1950
ST. JOE OPERATION

State	Working	Acres Worked															
		By Forest Service					By Bureau of Entomology and Plant Quarantine					Total Federal		Total Other			GRAND TOTAL
		National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	State	Private	Total	National Forest	Public Domain	State	Private	Total	
Idaho	First	80			130	210	10		90	1,090	1,190	90		90	1,220	1,310	1,400
	Second	3,570		440	150	4,160	220		100	290	610	3,790		540	440	980	4,770
	Other	3,950	320	220	530	5,020	1,060	150	1,280	530	3,020	5,010	470	1,500	1,060	2,560	8,040
	Total	7,600	320	660	810	9,390	1,290	150	1,470	1,910	4,820	8,890	470	2,130	2,720	4,850	14,210

TABLE 5

SUMMARY OF RIBES ERADICATION, 1929-1950
ST. JOE OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Plantation	1940-49	2,210	4,760	1,093,000	2.15	495	1,930	360
	Cutover	1940-49	3,100	4,530	659,000	1.46	213	3,100	63,240
	Cutover	1920-39	34,980	24,480	7,634,000	.70	218	34,980	158,760
	Reproduction	1910-39	218,280	241,760	81,220,000	1.11	372	153,090	63,300
	Pole		116,070	102,830	10,445,000	.89	90	115,530	26,290
	Mature		157,850	54,560	13,868,000	.35	88	81,500	121,080
	Miscellaneous		2,650	2,300	767,000	.87	289	1,040	3,970
	Stream		7,380	29,370	20,899,000	4.00	2,832	6,330	300
	Total		542,520	464,590	136,585,000	.86	252	397,500	437,300
Second	Plantation	1940-49	1,270	1,230	59,000	.97	46	1,040	
	Cutover	1940-49	460	590	21,000	1.28	46	460	
	Cutover	1920-39	12,620	13,670	584,000	1.08	46	12,620	
	Reproduction	1910-39	92,880	107,760	9,435,000	1.16	102	88,980	
	Pole		60,580	40,680	4,112,000	.67	68	60,580	
	Mature		6,480	4,990	570,000	.77	88	4,380	
	Miscellaneous		540	730	34,000	1.35	63	530	
	Stream		5,100	15,090	3,001,000	2.96	588	4,920	
	Total		179,930	184,740	17,816,000	1.03	99	173,510	
Other	Plantation	1940-49	810	1,120	20,000	1.38	25	750	
	Cutover	1920-39	7,500	5,990	100,000	.80	13	5,600	
	Reproduction	1910-39	38,940	59,330	1,140,000	1.52	29	31,690	
	Pole		28,000	17,540	802,000	.63	29	21,030	
	Mature		3,930	4,600	406,000	1.17	103	430	
	Stream		4,610	10,590	1,021,000	2.30	221	4,250	
	Total		83,790	99,170	3,489,000	1.18	42	63,750	
GRAND TOTAL			806,240	748,500	157,890,000	.93	196	634,760	

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	7,750	22,230	700,000
Second	3,350	4,940	113,000
Other	3,300	3,610	29,400
Total	14,400	30,780	842,400

TABLE 6

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1929-1950
ST. JOE OPERATION

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Coop.	70,590	59,330	5,808,000	82,400	.84	82
	EQ-Emerg.	234,520	157,900	43,593,000	77,000	.67	186
	FS-Reg.	237,130	260,000	36,255,000	334,000	1.10	153
	FS-Cont.	780	730	11,000	-	.94	14
	FS-Emerg.	70,980	45,140	15,333,000	101,000	.64	216
	CCC	192,240	225,400	56,890,000	248,000	1.17	296
	Total	806,240	748,500	157,890,000	842,400	.93	196

TABLE 7

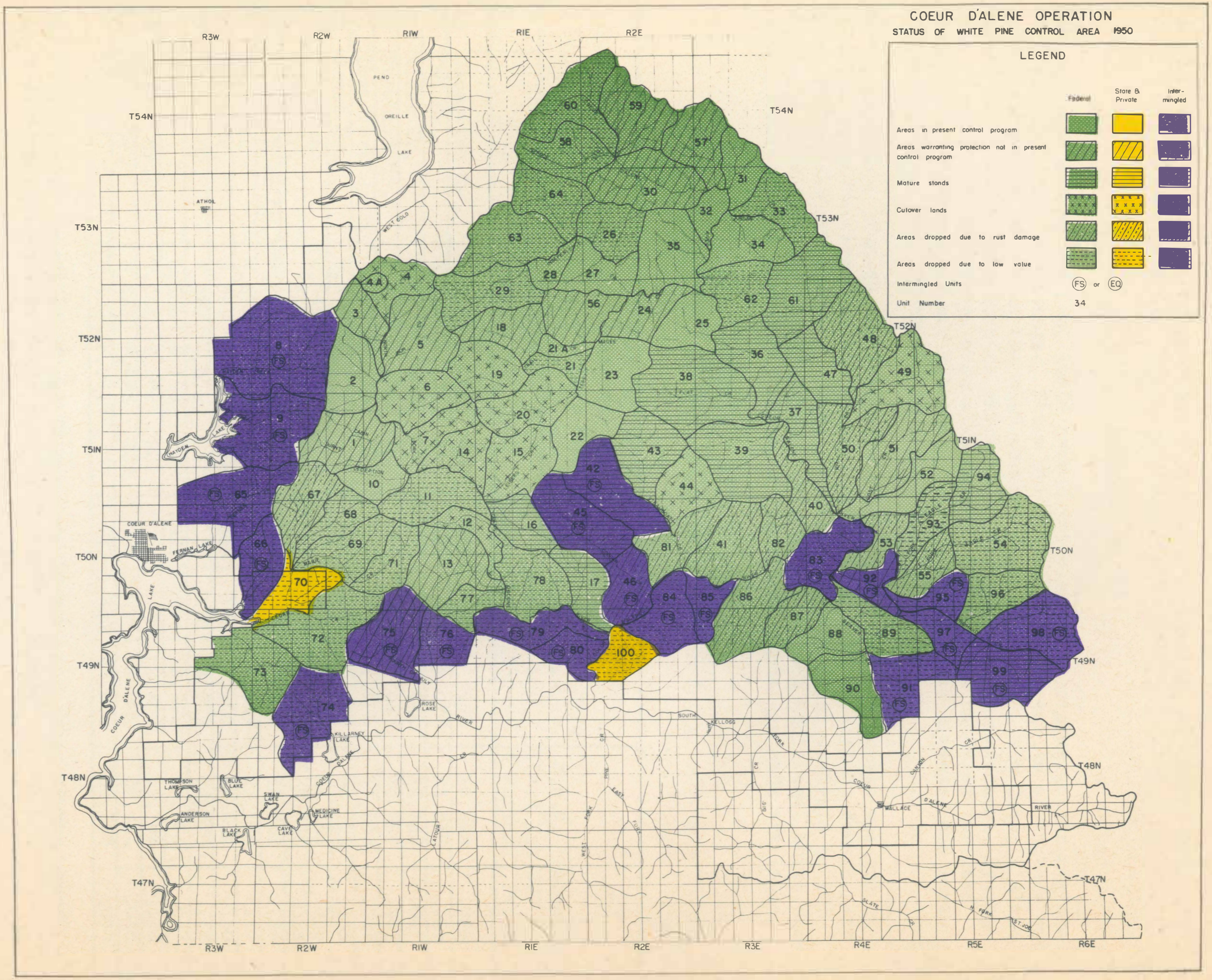
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1929-1950
ST. JOE OPERATION

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Other	Total		
Idaho	National Forest	200,770	99,440	36,550	336,760	94,060	294,830
	Public Domain	11,010	5,210	2,660	18,880	14,190	25,200
	Subtotal Federal	211,780	104,650	39,210	355,640	108,250	320,030
	State	52,160	23,180	6,980	82,320	72,540	124,700
	Private	133,560	45,680	17,560	196,800	256,510	390,070
	Subtotal Other	185,720	68,860	24,540	279,120	329,050	514,770
	Total	397,500	173,510	63,750	634,760	437,300	834,800

TABLE 8

RIBES SPECIES ERADICATED
ST. JOE OPERATION

Working	Period	Gross Acres	Ribes Species						Total Ribes
			lacustre	viscosissimum	petiolare	inerme	irriguum	triste	
First	1950	1,400	73,000	399,000	1,000				473,000
	1929-50	542,520	46,833,000	82,524,000	3,521,000	3,202,000	505,000		136,585,000
Second	1950	4,770	35,000	47,000	1,000				83,000
	1929-50	179,930	8,031,000	7,631,000	1,126,000	837,000	49,000	142,000	17,816,000
Other	1950	8,040	60,000	35,000	4,000				99,000
	1929-50	83,790	1,702,000	798,000	604,000	381,000	2,000	2,000	3,489,000
Total	1950	14,210	168,000	481,000	6,000				655,000
	1929-50	806,240	56,566,000	90,953,000	5,251,000	4,420,000	556,000	144,000	157,890,000


COEUR D'ALENE OPERATION
STATUS OF WHITE PINE CONTROL AREA 1950
LEGEND
Federal
State & Private
Inter-mingled
Areas in present control program
Areas warranting protection not in present control program
Mature stands
Cutover lands
Areas dropped due to rust damage
Areas dropped due to low value
Intermingled Units
FS or EQ
Unit Number
34
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
T54N
T53N
T52N
T51N
T50N
T49N
T48N
T47N
PEND OREILLE LAKE
ATHOL
COEUR D'ALENE
FERNAN LAKE
HAYDEN LAKE
COEUR D'ALENE LAKE
ROSE LAKE
KILLARNEY LAKE
THOMPSON LAKE
BLUE LAKE
SWAN LAKE
ANDERSON LAKE
BLACK LAKE
CAVE LAKE
MEDICINE LAKE
WALLACE
RIVER

BLISTER RUST CONTROL, COEUR D'ALENE OPERATION, 1950

By
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C. J. Pederson, Forest Officer, U. S. Forest Service

INTRODUCTION

Control work during the 1950 field season was planned according to the regional working unit priority ratings. These priorities are the results of surveys and analyses carried on during the past several years. In 1943, the Coeur d'Alene forest was divided into working units using topographical boundaries. Systematic classification surveys were also begun. Information gathered included stocking, stand composition, age class, site, blister rust disease, and working conditions. This phase was completed in 1947.

During the years 1948-49, an intensive stocking and disease survey was run on selected areas to determine the percent of blister rust infection, damage, and white pine stocking remaining. Upon completion of the final analysis on 102 units, 15 were included in the present program. Fourteen additional units warrant inclusion in an expanded program if additional funds are made available.

WORKING UNITS IN THE PRESENT BLISTER RUST CONTROL PROGRAM

Working Unit			Man-Day Estimate for Protection Present Stands		1950 Work		Man-Days Remaining 1950-54	M.B.F. Yield 1st 6 Periods	Man-Day BRC Cost Per M.
No.	Name	Gross Acres	1950-1954	1955-1970	Acres	Man-Days			
10	Deception Cr.	3,525	1,700	400	829	1,098	602	25,640	.036
27	Owl Cr.	5,267	1,731	396	1,621	654	1,077	83,650	.039
31	Alden Cr.	4,267	629	337	175	87	542	36,332	.041
28	Snowbird Cr.	1,789	955	352	565	503	452	35,986	.051
34	Lost Fork Jordan	7,233	1,929	552			1,929	77,585	.055
25	Brett Cr.	5,573	1,173	564	568	521	652	98,982	.033
32	Cathedral	2,544	1,673	404			1,673	46,753	.055
4A	Honey Cr.	280	57	106			57	7,656	.023
52	E. Fk. Lost Cr.	7,097	6,174	679			6,174	62,763	.139
35	West Elk	8,371	1,949	390			1,949	21,189	.167
88	White Cr.	4,089	1,546	572	589	352	1,194	18,692	.130
23	Halsey Cr.	7,211	4,079	862	55	120	3,959	44,270	.135
2	Hudlow	6,350	4,199	630	923	1,204	2,995	53,674	.087
90	Dudley Cr.	7,054	2,602	801			2,602	29,782	.122
22	Tepee Cr.	6,455	2,845	690	1,802	1,817	1,028	63,434	.048
Total		77,105	33,241	7,735	7,127	6,356	26,885	706,388	.077

The 1950 program consisted of one 60-man, one 10-man, and three 30-man camps. There were 45 contracts in force with 35 contract workers.

LOCATION AND DESCRIPTION OF AREAS

Hudlow Camp, 30-Man, Working Unit No. 2. The crew was housed in the semipermanent forest work camp located on Hudlow Creek. Work was performed in the east and west forks of Hudlow and Nicholas Creek drainages, including the river facing slope between Hudlow and Nicholas Creeks. The power sprayer was used in Hudlow Creek. Hi-Fog and knapsack sprayers were used on the other stream type areas. Broadcast spraying was completed on 6 acres of stream type on Iron Creek to protect nearby pole stands. A total of 923 acres was covered with 500 acres being placed on maintenance and the remainder on post check. This camp will be reoccupied in 1951 to continue work in Nicholas Creek and spot working in Hudlow Creek.

Lone Cabin Camp, 30-Man, Working Unit No. 10. This camp, first established in 1947 on Lone Cabin Creek, has been reoccupied each season since that time. Men were trucked 2 miles to their work area. Work was performed in upper Deception, Haystack, Hoodoo, and Coffee Creek drainages. Ribes were removed from 829 acres requiring 1.32 man-days per acre. Six hundred acres were placed on maintenance and the remainder on post check.

The Deception Creek unit is a very fertile area for the regeneration of ribes. Wherever there is soil disturbance and sufficient light, Ribes lacustre and R. viscosissimum become established in great numbers. During the past two winters, blow-down and snow damage have caused openings in the pole stands. Affected stands that were on maintenance will now require additional work. The work in this unit will be brought up to schedule under the 5-year program in 1951 by contract workers.

Riley Creek Camp, 60-Man, Working Unit No. 22. This camp, located at the mouth of Riley Creek, has been occupied by blister rust control crews for the past three seasons. Control work on the 6,000-acre block of reproduction and pole stands included second working on 1,800 acres of pole stands in "Y" and Short Creek drainages with 1,100 acres being placed on maintenance.

Difficult working was encountered in the dense alder patches at the head of Short Creek. Ribes along the road bounding the head of Short Creek were treated with 2,4,5-T. This camp will be occupied in 1951. Work will be completed in Tepee Creek, Unit No. 22, and continued in Halsey Creek, Unit No. 23.

Independence Creek Camp, 30-Man, Working Units Nos. 25-27. In working unit No. 27, all upland area west of Independence Creek to the Owl Creek divide was given second working. Stream type ribes in Yellow Pine, Trident, and main Independence Creeks to the mouth of Owl Creek were sprayed with 2,4,5-T using knapsack sprayers. A total of 1,621 acres was worked using .40 man-day per acre. This work placed 700 acres on maintenance. Difficult working conditions were encountered in the 136-acre pole stand at the mouth of Independence Creek. Portions of this area contained windfalls, rock outcrops, and numerous R. lacustre. The remaining area was 1933-34 plantation, and working conditions were not difficult.

In working unit No. 25, 40 acres were worked along the Miner-Brett Creek divide.

Magee Camp, 10-Man, Working Units Nos. 22 and 23. A 10-man chemical crew was quartered at the Magee Ranger Station, using a 1½-ton truck for transportation. Work was performed on Halsey, Tepee, and Short Creeks. A total of 120 acres of ribes in stream type was sprayed, using 3,450 gallons of solution requiring 1.92 man-days per acre. Since the stream type on Tepee Creek was bulldozed in 1934, numerous R. inerme have become re-established. In some instances, small ribes were numerous in dense grass and sod. A power broadcast spray was applied to the ribes concentrations and knapsack units were used on scattered bushes.

Contract Work, Working Units Nos. 25, 28, 31, and 88. The contract program for ribes eradication was continued with 45 contracts in force. This includes three extensions from the 1949 season. Contract work was performed in Brett, White, Alden, and Snowbird Creek units. Bid prices ranged from $4.89 to $23.75 per acre with an average of $13.55. Contract work involved 2,763 acres with a total obligation of $37,994.32. Administrative costs were $2.40 per acre. Nineteen hundred acres were worked in 1950, of which 1,000 were placed on maintenance. Man-day requirements were .77 per acre. The checking charge of 50 cents per acre after the initial check was too low. In a few cases, contractors called for subsequent checks presumably for the purpose of establishing a definite ribes pattern. The checking charge should be increased to prevent recurrence of this problem. Except for a few isolated cases, contract work was satisfactory. Interest remains high and contract work will be continued next year.

PERSONNEL AND SAFETY

Camp personnel was made up mainly of college students with many eastern schools being represented. All camps had excellent crews with 50 percent of the men having had previous blister rust control experience. All supervisory personnel and checkers were experienced.

Cooperation of all personnel in the project safety program resulted in completing the 1950 season without a lost time accident.

WORKING METHODS

A supervisory personnel training school was held at Camp Hudlow on June 9. Complete instructions were given on all phases of control work. Crewmen were given thorough training at their respective camps. The one-man dragline method was the standard procedure in all camps. On a few specific areas the three-man crew and scout formations were used.

The chemical 2,4,5-T was used exclusively for chemical ribes eradication work. Equipment included Hi-Fog, knapsack, and power sprayers. The results obtained from the use of 2,4,5-T in 1949 were satisfactory. A few resprouts were noticed in the early spring of 1950, but a large percentage died back during the summer. Aerial spray was applied by helicopter on two areas using 10 gallons of 2,4,5-T solution per acre. On July 11, 43 acres of stream type on lower Independence Creek were treated. This brushy, swampy, ribes-infested area could not have been worked as efficiently by any other method. A follow-up spray will be applied in 1951.

Starting August 22, 380 acres of upland ribes and brush on upper New Deal Creek and the head of President Creek were sprayed by helicopter, using 3,910 gallons of chemical solution. It is believed that this ribes hazard can be most economically removed by the aerial spray method. The type of follow-up work will depend upon the results of the 1950 work.

On Lost Fork Jordan Creek, working unit No. 34, 100 acres were cleared of brush, numerous ribes, and windfalls by control burning. This area ties in with a 60-acre 1946 control burn and is adjacent to extensive white pine plantations. This area will be planted to white pine after protection has been established.

CHECKING AND SURVEYS

Checking personnel reporting in the spring were experienced and capable men. Several new checkers were trained during the season to replace those entering the armed services and others that went into contract work.

Where ribes eradication was performed on a lot basis, the checker ran an 8-foot wide meandering course between the boundaries of the 2½-chain wide lanes, and each strip was tied in at 5-chain intervals. On the few areas not worked by lot method, a flanker check was used. All work was promptly checked upon completion by the eradication crews. When not occupied with checking current season's work, checking personnel laid string for crew lanes or ran post checks.

POST CHECK, 1950

Working Unit Number	Name	Drainage	Acres Checked
88	White Creek	White Creek	1,135
22	Tepee	Short Creek	814
28	Snowbird	Independence Creek	70
1	Burnt Cabin	Lone Cabin Creek	46
2	Hudlow	West Fork Hudlow	242
2	Hudlow	Nicholas Creek	640
31	Alden Creek	Alden Creek	803
10	Deception Creek	Deception Creek	1,450
			5,200

STOCKING AND PINE DAMAGE SURVEYS, 1950

Stocking and pine damage surveys were continued on a small scale this year. Additional strips were run on doubtful areas and a few outlying unsurveyed areas. This information was essential for analysis to determine potential pine values in relation to blister rust control work. Two men worked throughout the summer on this survey.

During the past season, 3,900 chains of survey strips were run in the following drainages:

Working Unit Number	Drainage	Chains Survey Strip
2	Hudlow Creek	195
2	Canyon Creek	387
3	Llewelling Creek	80
3	Little North Fork	279
4A	Little North Fork	72
18	Hamilton Creek	456
18	Callis Creek	60
21	Trail Creek	247
22	Y Creek	323
22	Short Creek	370
23	Little Elk Creek	255
23	Drexall Creek	110
23	Halsey Creek	395
31	Alden Creek	140
35	West Elk Creek	323
35	Cataract Creek	208
		3,900

CONTROL STATUS

Work during the 1951-54 seasons will be confined to the 77,000 gross acres within the 15 selected units. As a result of control work, 21,000 acres of this area are on maintenance which includes 3,900 acres due to 1950 work. Control work on these units will be up to date by 1955 with a high percentage of the acreage on maintenance.

Prior to 1950, maintenance has been reported on the 383,000 acres of white pine lands within the original control boundary. Under the present program, 76,000 acres of maintenance areas are outside of the selected 15 working units. Where these maintenance areas consist of several hundred acres in size and adjacent areas are light in ribes, damage will not be severe even though no additional work is done. This will be particularly true in mature and advance pole stands. Small maintenance areas surrounded by ribes infested lands will suffer severe damage if no future work is performed.

RESULTS

The following tables show statements of expenditures, results of the 1950 field work, and accumulative results of work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1950
COEUR D'ALENE OPERATION

Item	Bureau of Entomology and Plant Quarantine BLR-1-4	Forest Service BLR-4	Total
Salaries perm. men	$6,078	$ 27,741	$ 33,819
Salaries temp. men		14,834	14,834
Wages temp. laborers	5	59,401	59,406
Contract ribes erad.		22,796	22,796
Subsistence supplies		22,684	22,684
Chemical		3,142	3,142
Equipment		2,124	2,124
Travel and transp.	263	8,897	9,160
Other expenses	183	6,422	6,605
Total	$6,529	$168,041	$174,570

TABLE 2

SUMMARY OF RIBES ERADICATION, 1950
COEUR D'ALENE OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Plantation	1940-49	80	90	5,000	1.13	63
	Cutover	1920-39	190	340	18,000	1.79	95
	Reproduction	1910-39	200	140	5,000	.70	25
	Pole		260	290	3,000	1.12	12
	Mature		60	70	1,000	1.17	17
	Total		790	930	32,000	1.18	41
Second	Plantation	1940-49	110	100	4,000	.91	36
	Cutover	1920-39	60	40	1,000	.67	17
	Reproduction	1910-39	40	70	4,000	1.75	100
	Pole		2,960	2,670	40,000	.90	14
	Stream		30	100	3,000	3.33	100
	Total		3,200	2,980	52,000	.93	16
Other	Plantation	1940-49	370	400	14,000	1.08	38
	Cutover	1920-39	70	140	2,000	2.00	29
	Reproduction	1910-39	2,160	1,220	17,000	.56	8
	Pole		270	190	3,000	.70	11
	Stream		280	500	78,000	1.79	279
	Total		3,150	2,450	114,000	.78	36
GRAND TOTAL			7,140	6,360	198,000	.89	28

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
Second	30	100	330
Other	280	500	7,830
Total	310	600	8,160

Contract work included above:

Working	Acres	Man-Days	Ribes
First	280	230	9,000
Second	740	530	21,000
Other	880	700	19,000
Total	1,900	1,460	49,000

TABLE 3

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1950
COEUR D'ALENE OPERATION

State	Working	Acres Worked By Forest Service		
		National Forest	Private	Total
Idaho	First	790		790
	Second	3,200		3,200
	Other	3,030	120	3,150
	Total	7,020	120	7,140

TABLE 4

SUMMARY OF RIBES ERADICATION, 1927-50
COEUR D'ALENE OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Burn	1940-49	710	350	54,000	.49	76	710	
	Plantation	1940-49	2,040	2,590	503,000	1.27	247	2,040	150
	Cutover	1940-49	630	500	64,000	.79	102	630	10,140
	Cutover	1920-39	16,770	22,220	5,443,000	1.32	325	16,770	18,840
	Reproduction	1910-39	91,120	140,440	20,744,000	1.54	228	89,300	9,380
	Pole		66,250	31,670	4,488,000	.48	68	65,520	9,180
	Mature		141,190	87,830	13,803,000	.62	98	123,170	7,300
	Miscellaneous		13,330	16,700	2,966,000	1.25	223	12,910	300
	Stream		14,990	58,500	11,883,000	3.90	793	14,880	2,540
	Total		347,030	360,800	59,948,000	1.04	173	325,930	57,830
Second	Plantation	1940-49	1,140	1,970	155,000	1.73	136	1,140	
	Cutover	1940-49	30	20	1,000	.67	33	30	
	Cutover	1920-39	9,510	13,490	1,977,000	1.42	208	9,510	
	Reproduction	1910-39	23,960	37,000	2,135,000	1.54	89	23,230	
	Pole		9,550	7,730	569,000	.81	60	9,550	
	Mature		10,360	8,270	823,000	.80	79	10,060	
	Miscellaneous		1,590	2,960	358,000	1.86	225	1,590	
	Stream		8,400	15,520	1,662,000	1.85	198	8,290	
	Total		64,540	86,960	7,680,000	1.35	119	63,400	
Other	Plantation	1940-49	1,290	1,750	78,000	1.36	60	1,290	
	Cutover	1920-39	5,100	9,560	451,000	1.87	88	5,100	
	Reproduction	1910-39	9,560	11,770	366,000	1.23	38	8,970	
	Pole		2,090	1,780	83,000	.85	40	2,080	
	Mature		2,000	1,480	84,000	.74	42	2,000	
	Miscellaneous		60	70	4,000	1.17	67	60	
	Stream		2,140	3,760	259,000	1.76	121	2,130	
	Total		22,240	30,170	1,325,000	1.36	60	21,630	
GRAND TOTAL			433,810	477,930	68,953,000	1.10	159	410,960	

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	110	730	7,000
Second	600	1,230	14,050
Other	510	950	11,660
Total	1,220	2,910	32,710

TABLE 5

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS 1927-50
COEUR D'ALENE OPERATION

State	Class	Gross Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Reg.	25,780	8,350	2,846,000		.32	110
	EQ-Emerg.	41,040	35,540	6,589,000		.87	161
	FS-Reg.	104,070	124,760	15,670,000	32,560	1.20	151
	FS-Cont.	2,940	2,380	83,000	150	.81	28
	FS-Emerg.	111,710	86,900	17,620,000		.78	158
	CCC	148,270	220,000	26,145,000		1.48	176
	Total	433,810	477,930	68,953,000	32,710	1.10	159

TABLE 6

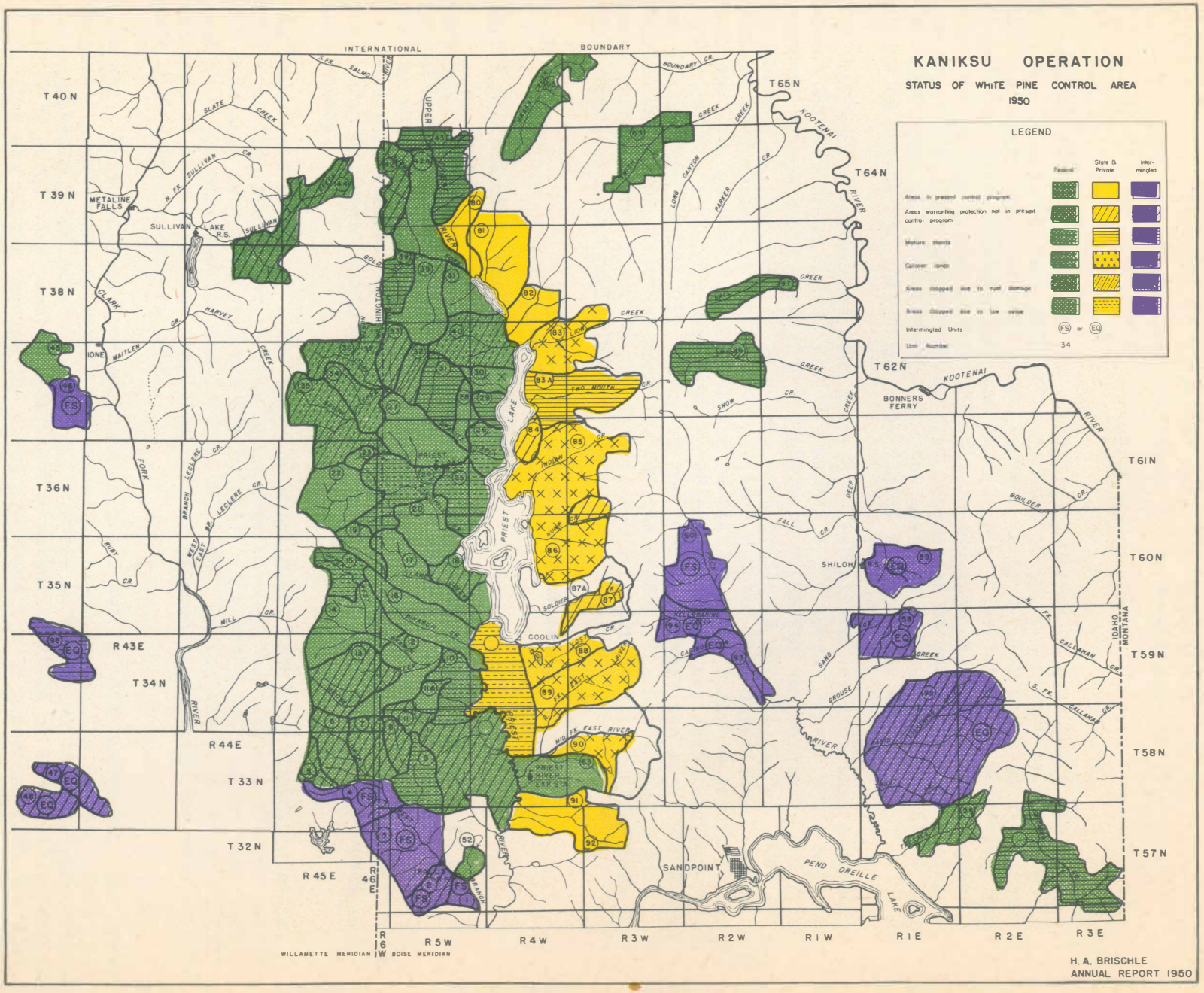
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION 1927-1950
COEUR D'ALENE OPERATION

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Other	Total		
Idaho	National Forest	309,780	61,050	21,380	392,210	50,880	360,660
	State	5,430	440	50	5,920	710	6,140
	Private	10,720	1,910	200	12,830	6,240	16,960
	Subtotal Other	16,150	2,350	250	18,750	6,950	23,100
	Total	325,930	63,400	21,630	410,960	57,830	383,760

TABLE 7

RIBES SPECIES ERADICATED
COEUR D'ALENE OPERATION

Working	Period	Gross Acres	Ribes Species					Total Ribes
			lacustre	viscosissimum	petiolare	inerme	irriguum	
First	1950	790	31,000	1,000				32,000
	1927-50	347,030	38,516,000	16,026,000	46,000	4,958,000	402,000	59,948,000
Second	1950	3,200	46,000	6,000				52,000
	1927-50	64,540	5,367,000	1,817,000	5,000	467,000	24,000	7,680,000
Other	1950	3,150	97,000	8,000		9,000		114,000
	1927-50	22,240	1,084,000	191,000		49,000	1,000	1,325,000
Total	1950	7,140	174,000	15,000		9,000		198,000
	1927-50	433,810	44,967,000	18,034,000	51,000	5,474,000	427,000	68,953,000


KANIKSU OPERATION
STATUS OF WHITE PINE CONTROL AREA
1950
LEGEND
Federal
State & Private
Inter-mingled
Areas in present control program
Areas warranting protection not in present control program
Mature stands
Cutover lands
Areas stopped due to rust damage
Areas stopped due to low value
Intermingled Units
Unit Number
(FS) or (EQ)
34
INTERNATIONAL BOUNDARY
T40N
T39N
T38N
T36N
T35N
T34N
T33N
T32N
T65N
T64N
T62N
T61N
T60N
T59N
T58N
T57N
R43E
R44E
R45E
R46E
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R5W
R6W
WILLAMETTE MERIDIAN
BOISE MERIDIAN
METALINE FALLS
SULLIVAN LAKE R.S.
IONE
BONNERS FERRY
SHILOH
COOLIN
SANDPOINT
PRIEST RIVER EXP. STA.
PEND OREILLE LAKE
KOOTENAI RIVER
PRIEST LAKE
PRIEST RIVER
IDAHO MONTANA
H. A. BRISCHLE
ANNUAL REPORT 1950

BLISTER RUST CONTROL, KANIKSU OPERATION, 1950

By
H. A. Brischle, Operation Supervisor
R. L. Hilding, Forester, U. S. Forest Service

INTRODUCTION

The Forest Service phase of the operation consisted of five camps employing 156 men. Under contract were 18 areas awarded to 10 contractors. A crew of five men operating a truck-mounted sprayer using 2,4,5-T spray treated areas of cutover, burn, reproduction and stream type. The Bureau of Entomology and Plant Quarantine program consisted of a 30-man camp and five contract areas. The construction of camps was hampered because of an unusually late spring. The first camp was manned on May 22, the last one on June 26. The first camp closed on August 26. All camps were closed by September 16.

All work was in accordance with priorities established by unit area analyses. Forest Service crews and contractors worked 8,960 acres; Bureau crews and contractors worked 2,550 acres. The employment situation was favorable and full contingents of high quality personnel were available for all camps. Most of the workers were college students with previous blister rust experience. Labor turnover was low, most of the men staying on the job until ready to return to school in September. A 48-hour work week in effect through June, July, and August was one factor which materially increased the seasonal output per man. The Forest Service had 7,300 effective man-days for the season; the Bureau had 1,330. There were very few fires on the forest; the call for blister rust workers for fire suppression was negligible.

LOCATION AND DESCRIPTION OF AREAS

Forest Service Camps on Federal Lands

Camp 451. This camp was located near the Pelke Administrative site in unit number 12 known as the Pelke Working Unit. The camp completed 120 acres of initial work and 1,860 acres of rework in cutover, reproduction, and 60- to 80-year-old pole stands. An area of 130 acres in stream type was treated with backpack spray equipment using 2,4,5-T. An estimated 1,600 ribes were treated by this method.

The Pelke unit comprises 7,200 acres of which 6,400 have a producing potential of 128 million feet of white pine saw timber through the next six 20-year periods. The ownership is 90% federal and 10% private. The estimated blister rust work load is 6,300 man-days for the period 1947-1966. During the past season, 1,570 man-days of this work were completed. It is planned to continue the work on this unit with a 25-man camp in 1951.

Camp 452. This camp was located on Kalispell Creek in unit number 22. The crews completed 1,560 acres of rework on plantation areas during the season. This unit has a gross of 9,500 acres of which 5,200 acres were planted to white pine following a 1939 burn. The planted areas have a potential yield of 240 million feet of white pine saw timber through the first crop rotation if protected from the rust. The ownership is 100% federal. It is estimated the control job will require 5,300

man-days for the period 1947-1966. During the past season, 1,100 man-days of this work were completed. It is planned to continue work with a 25-man crew on this unit in 1951.

Camp 453. This camp was located on Granite Creek near Nordman, Idaho. This camp completed 1,700 acres of necessary rework in 60- to 80-year-old pole stands. Ten acres of large Ribes lacustre in rock slides near Reeder Lake were treated using backpack sprayers and 2,4,5-T. Approximately 2,800 large R. lacustre were treated at the rate of 1.0 man-day per acre. Despite the fact that the rework on this area is several years behind schedule, the rust has not made serious inroads on the stand.

The Reeder Mountain unit comprises 7,750 acres of young white pine pole stands which have a producing potential of 102 million feet of white pine saw timber within the next 20 years. The ownership is 88% federal and 12% private. It is estimated the blister rust work load will be 5,300 man-days during the next 20 years. This year 1,290 man-days of this work were completed. In 1951 it is planned to have two pack camps on this area to continue with the rework.

Pack Camps 454 and 455. These camps were located in unit number 40 known as the Boulder Creek Unit in the vicinity of Upper Priest Lake. A late spring handicapped getting these camps constructed. Despite a late start and frequent rains throughout the summer, the crews completed 1,450 acres of rework in young pole stands. Although no work has been done on this unit since 1936, a recent disease survey shows rust losses to be only 15%. This loss is not detrimental to the stocking. All areas were post checked, and 800 acres were eliminated from crew work.

The Boulder unit comprises 5,700 acres of young white pine pole and reproduction which is all in federal ownership. It is estimated the ultimate yield for this unit will be 123 million feet of white pine saw timber. Estimates show it will require 2,700 man-days to do the necessary rework in the next 20-year period. During the past season, 1,700 man-days were completed. It is planned to locate a small camp on the road near Gold Peak in 1951 to complete the rework.

Power spray work. A five-man Forest Service crew was trained to operate a truck-mounted power spray unit. This crew using 2,4,5-T spray treated areas of recent burn, cutover, and stream type. An area adjacent to plantations in the vicinity of Diamond Peak and an area of recent cutover on Guinn Creek on the Lower West Branch supporting many small R. lacustre and R. viscosissimum were treated by the broadcast method. The crew covered 230 acres using 30,000 gallons of solution at an average rate of 1.08 man-days per acre. It is estimated 234,000 ribes were destroyed.

An administrative check was made on areas treated in 1949 with Hi-Fog equipment. Results in the vicinity of Kalispell Rock were better than expected.

Contract work. Eighteen contract areas totaling 1,687 acres were completed during the year. Nine incomplete contract areas totaling 856 acres will be finished next year. Sixteen areas are located in the Lower West Branch and three in plantations in the Lamb and Bath Creeks. The contract prices varied from $6.25 to $18.90 per acre depending on working conditions. The average net price paid to contractors was $13.73 per acre. Data submitted by the contractors

show that an average of 28 ribes per acre was removed at the rate of 0.76 man-day per acre.

Contract work started in April on open exposures and continued through September. All contract areas were given a post check to determine the ribes pattern and the necessity for work. Areas approved for payment were carefully checked to meet contract specifications. The 18 completed contract areas were awarded to 10 different contractors. Approximately 25 men participated in the work. All contractors who carried on in a businesslike manner were able to show good earnings for their work. The death of two contractors during the year brought up a number of fiscal problems involving payments for work to heirs and estates. Contractors were better equipped with transportation and camp facilities than in previous years. Several workers have been called for military service. At the present outlook, it appears that some of our best contract workers will be in the armed services by next spring.

Cooperative Camps on State and Private Lands

Camp 401. This camp was located in the Trail Creek working unit near Naples, Idaho. Because of a late spring, it was impossible to establish the pack camp originally planned to work the upper end of the drainage. Accordingly, work plans were changed to do needed rework on areas accessible to the camp by truck and trail. The first crews arrived June 5, and the last crews stayed until September 16. All areas were checked and those not requiring work were eliminated. A total of 550 acres of initial and 1,370 acres of rework was completed. Backpack spray units and 2,4,5-T spray were used to treat large R. lacustre along the roads and in stream type.

The Trail Creek unit comprises 7,400 acres of 60- to 80-year-old white pine pole and reproduction stands. The ownership is intermingled in the following ratio: federal, 47%; state, 10%; private, 43%. The largest private holdings belong to Pack River Lumber Company. The white pine yield for the unit is estimated to be 52 million feet of saw timber. It is estimated 3,000 additional man-days are needed to do a complete job of blister rust work for the period through 1966. It is planned to continue the work in this unit with a 25-man pack camp next year.

Contract work. Contracts totaling 628 acres obligating $8,109.26 were completed in the Fox Creek and Caribou Creek drainages. Two additional contracts totaling 192 acres were not completed and time extensions have been granted. Bid prices ranged from $9.84 for an area on Fox Creek to $15.93 for one on Caribou Creek. The average cost was $12.91 per acre.

Contract work started in May and continued to September 15. The five completed contracts were awarded to five different contractors. Approximately 15 men participated in the work. One contractor was drowned in Priest Lake when his boat capsized during a storm. A will executed shortly before his death named a co-worker as executor. The co-worker finished the uncompleted area and final payment for the work has been made. A 27-acre fire believed to have started from the contractor's camp occurred on the day the contract workers moved from the area.

CHECKING AND SURVEYS

A crew of 15 Forest Service and Bureau checkers did the necessary current and post check work. Camp and contract work areas were inspected promptly upon completion to insure the quality of the work. A sample random strip was run in each 1¼-acre lot and all likely ribes sites were inspected. By this method it is estimated 12 to 20 percent of the ground was inspected. Two men were required to lay out and check Forest Service contract work.

A check to determine the ribes pattern and need for rework was the basis for laying out all camp and contract work areas. A total of 9,200 acres was checked of which 2,280 acres were eliminated from crew work.

A four-man survey crew under the supervision of the Forest Service conducted a stocking and rust damage survey in five major drainages. The survey was started in June and completed the first week in September. A total of 180 miles of survey strip was run. Rust damage to pine on a quadrat basis for the units surveyed is as follows:

Upper Beaver Creek	49%
Grass Creek	16%
Grouse Creek	20%
Sand Creek	20%
Upper Pack River	28%

The survey is now 90% complete. The crew will be reduced to two men next year.

RESULTS

The following tables show statements of expenditures, results of the 1950 field work, and accumulative results of work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1950
KANIKSU OPERATION

Item	Bureau of Entomology & Plant Quarantine					Forest Service	
		Cooperative Control					
	BLR-1-4	Federal BLR-3-4	State & Private	Total	Total	BLR-4	Total
Salary perm. men	$10,785	$ 2,941		$ 2,941	$13,726	$ 27,756	$ 41,482
Salary temp. men	60	1,484		1,484	1,544	30,421	31,965
Wages temp. laborers	151	10,327		10,327	10,478	62,791	73,269
Contract ribes erad.		3,172	$5,231	8,403	8,403	21,889	30,292
Subsistence supplies	266	1,714		1,714	1,980	26,094	28,074
Chemicals	138				138	2,572	2,710
Equipment						4,392	4,392
Travel and transp.	906	615		615	1,521	5,530	7,051
Other expenses	589	250		250	839	4,363	5,202
Total	$12,895	$20,503	$5,231	$25,734	$38,629	$185,808	$224,437

TABLE 2

SUMMARY OF RIBES ERADICATION, 1950
KANIKSU OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Burn	1940-49	60	30	1,000	.50	17
	Plantation	1940-49	50	40	1,000	.80	20
	Cutover	1940-49	190	150	114,000	.79	600
	Cutover	1920-39	60	50	2,000	.83	33
	Pole		540	100	16,000	.19	30
	Stream		10	10	1,000	1.00	100
	Total		910	380	135,000	.42	148
Second	Plantation	1940-49	140	90	2,000	.64	14
	Cutover	1940-49	400	300	11,000	.75	28
	Cutover	1920-39	70	40	1,000	.57	14
	Reproduction	1910-39	370	230	3,000	.62	8
	Pole		5,190	3,850	90,000	.74	17
	Mature		180	100	1,000	.56	6
	Stream		900	1,100	27,000	1.22	30
	Total		7,250	5,710	135,000	.79	19
Other	Plantation	1940-49	1,000	760	30,000	.76	30
	Cutover	1920-39	970	580	6,000	.60	6
	Reproduction	1910-39	930	680	124,000	.73	133
	Pole		120	70	2,000	.58	17
	Stream		330	450	25,000	1.36	76
	Total		3,350	2,540	187,000	.76	56
GRAND TOTAL			11,510	8,630	457,000	.75	40

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	120	100	11,400
Second	280	230	4,400
Other	100	130	15,300
Total	500	460	31,100

TABLE 3

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1950
KANIKSU OPERATION

State	Working	Class	Acres	Man-Days	Ribes	Gallons Spray	Per Acre	
							Man-Days	Ribes
Idaho	First	EQ-Coop.	550	110	17,000	160	.20	31
		FS-Reg.	210	170	114,000	11,200	.81	543
		FS-Cont.	30	20	1,000		.67	33
		Total	790	300	132,000	11,360	.38	167
	Second	EQ-Coop.	1,370	850	34,000	180	.62	25
		FS-Reg.	3,980	3,690	77,000	4,110	.93	19
		FS-Cont.	520	380	14,000		.73	27
		Total	5,870	4,920	125,000	4,290	.84	21
	Other	EQ-Cont.	630	370	3,000		.59	5
		FS-Reg.	230	200	4,000		.87	17
		FS-Cont.	660	610	28,000		.92	42
		Total	1,520	1,180	35,000		.78	23
	All Workings	EQ-Coop.	1,920	960	51,000	340	.50	27
		EQ-Cont.	630	370	3,000		.59	5
		FS-Reg.	4,420	4,060	195,000	15,310	.92	44
		FS-Cont.	1,210	1,010	43,000		.83	36
		Total	8,180	6,400	292,000	15,650	.78	36
Washington	First	FS-Reg.	120	80	3,000		.67	25
	Second	FS-Reg.	1,280	730	9,000	160	.57	7
		FS-Cont.	100	60	1,000		.60	10
		Total	1,380	790	10,000	160	.57	7
	Other	FS-Reg.	1,450	1,110	148,000	15,280	.77	102
		FS-Cont.	380	250	4,000		.66	11
		Total	1,830	1,360	152,000	15,280	.74	83
	All Workings	FS-Reg.	2,850	1,920	160,000	15,440	.67	56
		FS-Cont.	480	310	5,000		.65	10
		Total	3,330	2,230	165,000	15,440	.67	50
Total	First	EQ-Coop.	550	110	17,000	160	.20	31
		FS-Reg.	330	250	117,000	11,200	.76	355
		FS-Cont.	30	20	1,000		.67	33
		Total	910	380	135,000	11,360	.42	148
	Second	EQ-Coop.	1,370	850	34,000	180	.62	25
		FS-Reg.	5,260	4,420	86,000	4,270	.84	16
		FS-Cont.	620	440	15,000		.71	24
		Total	7,250	5,710	135,000	4,450	.79	19
	Other	EQ-Cont.	630	370	3,000		.59	5
		FS-Reg.	1,680	1,310	152,000	15,280	.78	90
		FS-Cont.	1,040	860	32,000		.83	31
		Total	3,350	2,540	187,000	15,280	.76	56
	All Workings	EQ-Coop.	1,920	960	51,000	340	.50	27
		EQ-Cont.	630	370	3,000		.59	5
		FS-Reg.	7,270	5,980	355,000	30,750	.82	49
		FS-Cont.	1,690	1,320	48,000		.78	28
		Total	11,510	8,630	457,000	31,090	.75	40

TABLE 4

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1950
KANIKSU OPERATION

State	Working	Acres Worked												
		By Forest Service				By Bureau of Entomology & Plant Quarantine				Total Federal	Total Other			GRAND TOTAL
		National Forest	State	Private	Total	National Forest	State	Private	Total	National Forest	State	Private	Total	
Idaho	First	240			240	230		320	550	470		320	320	790
	Second	3,930	140	430	4,500	790	80	500	1,370	4,720	220	930	1,150	5,870
	Other	780		110	890		450	180	630	780	450	290	740	1,520
	Total	4,950	140	540	5,630	1,020	530	1,000	2,550	5,970	670	1,540	2,210	8,180
Washington	First	120			120					120				120
	Second	1,380			1,380					1,380				1,380
	Other	1,830			1,830					1,830				1,830
	Total	3,330			3,330					3,330				3,330
Total	First	360			360	230		320	550	590		320	320	910
	Second	5,310	140	430	5,880	790	80	500	1,370	6,100	220	930	1,150	7,250
	Other	2,610		110	2,720		450	180	630	2,610	450	290	740	3,350
	Total	8,280	140	540	8,960	1,020	530	1,000	2,550	9,300	670	1,540	2,210	11,510

TABLE 5

SUMMARY OF RIBES ERADICATION, 1923-1950
KANIKSU OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Burn	1940-49	500	800	160,000	1.60	320	500	
	Plantation	1940-49	3,000	1,700	503,000	.57	168	3,000	200
	Cutover	1940-49	6,000	5,000	968,000	.83	161	6,000	43,000
	Cutover	1920-39	12,200	9,000	1,877,000	.74	154	11,600	24,300
	Reproduction	1910-39	167,300	119,900	32,878,000	.72	197	160,700	24,400
	Pole		130,500	46,000	6,381,000	.35	49	129,200	23,300
	Mature		142,800	30,800	5,825,000	.22	41	110,500	39,300
	Miscellaneous		7,400	5,000	1,996,000	.68	270	6,000	1,300
	Stream		22,900	50,300	9,391,000	2.20	410	22,300	6,900
	Total		492,600	268,500	59,979,000	.55	122	449,800	162,700
Second	Plantation	1940-49	3,100	2,000	168,000	.65	54	3,100	
	Cutover	1940-49	1,100	700	22,000	.64	20	1,100	
	Cutover	1920-39	8,500	10,000	1,837,000	1.18	216	8,500	
	Reproduction		56,300	46,900	5,720,000	.83	102	55,300	
	Pole		44,300	20,900	1,251,000	.47	28	44,300	
	Mature		7,600	4,100	361,000	.54	48	7,600	
	Miscellaneous		1,400	700	47,000	.50	34	1,400	
	Stream		13,200	17,500	1,534,000	1.33	116	13,200	
	Total		135,500	102,800	10,940,000	.76	81	134,500	
Other	Plantation	1940-49	3,300	1,700	73,000	.52	22	3,300	
	Cutover	1940-49	400	300	30,000	.75	75	400	
	Cutover	1920-39	8,800	6,700	429,000	.76	49	8,800	
	Reproduction	1910-39	21,300	19,300	1,419,000	.91	67	21,300	
	Pole		2,600	900	69,000	.35	27	2,600	
	Mature		1,300	700	108,000	.54	83	1,300	
	Miscellaneous		600	300	6,000	.50	10	600	
	Stream		2,300	2,800	119,000	1.22	52	2,300	
	Total		40,600	32,700	2,253,000	.81	55	40,600	
GRAND TOTAL			668,700	404,000	73,172,000	.60	109	624,900	

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	870	930	26,800
Second	460	340	4,900
Other	250	330	32,200
Total	1,580	1,600	63,900

TABLE 6

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1923-1950
KANIKSU OPERATION

State	Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
						Man-Days	Ribes
Idaho	EQ-Coop.	184,500	74,200	13,132,000	2,300	.40	71
	EQ-Cont.	1,100	600	5,000		.55	5
	EQ-Emerg.	99,000	68,900	11,333,000		.70	114
	FS-Reg.	61,600	55,500	5,514,000	18,700	.90	90
	FS-Cont.	3,200	2,600	75,000		.81	23
	FS-Emerg.	99,300	38,800	8,788,000		.39	88
	CCC	62,400	50,500	8,452,000		.81	135
	Total	511,100	291,100	47,299,000	21,000	.57	93
Washington	EQ-Emerg.	31,600	19,300	6,754,000		.61	214
	FS-Reg.	66,700	54,100	11,609,000	42,900	.81	174
	FS-Cont.	600	400	10,000		.67	17
	FS-Emerg.	36,400	14,400	4,013,000		.40	110
	CCC	22,300	24,700	3,487,000		1.11	156
	Total	157,600	112,900	25,873,000	42,900	.72	164
Total	EQ-Coop.	184,500	74,200	13,132,000	2,300	.40	71
	EQ-Cont.	1,100	600	5,000		.55	5
	EQ-Emerg.	130,600	88,200	18,087,000		.68	138
	FS-Reg.	128,300	109,600	17,123,000	61,600	.85	133
	FS-Cont.	3,800	3,000	85,000		.79	22
	FS-Emerg.	135,700	53,200	12,801,000		.39	94
	CCC	84,700	75,200	11,939,000		.89	141
	Total	668,700	404,000	73,172,000	63,900	.60	109

TABLE 7

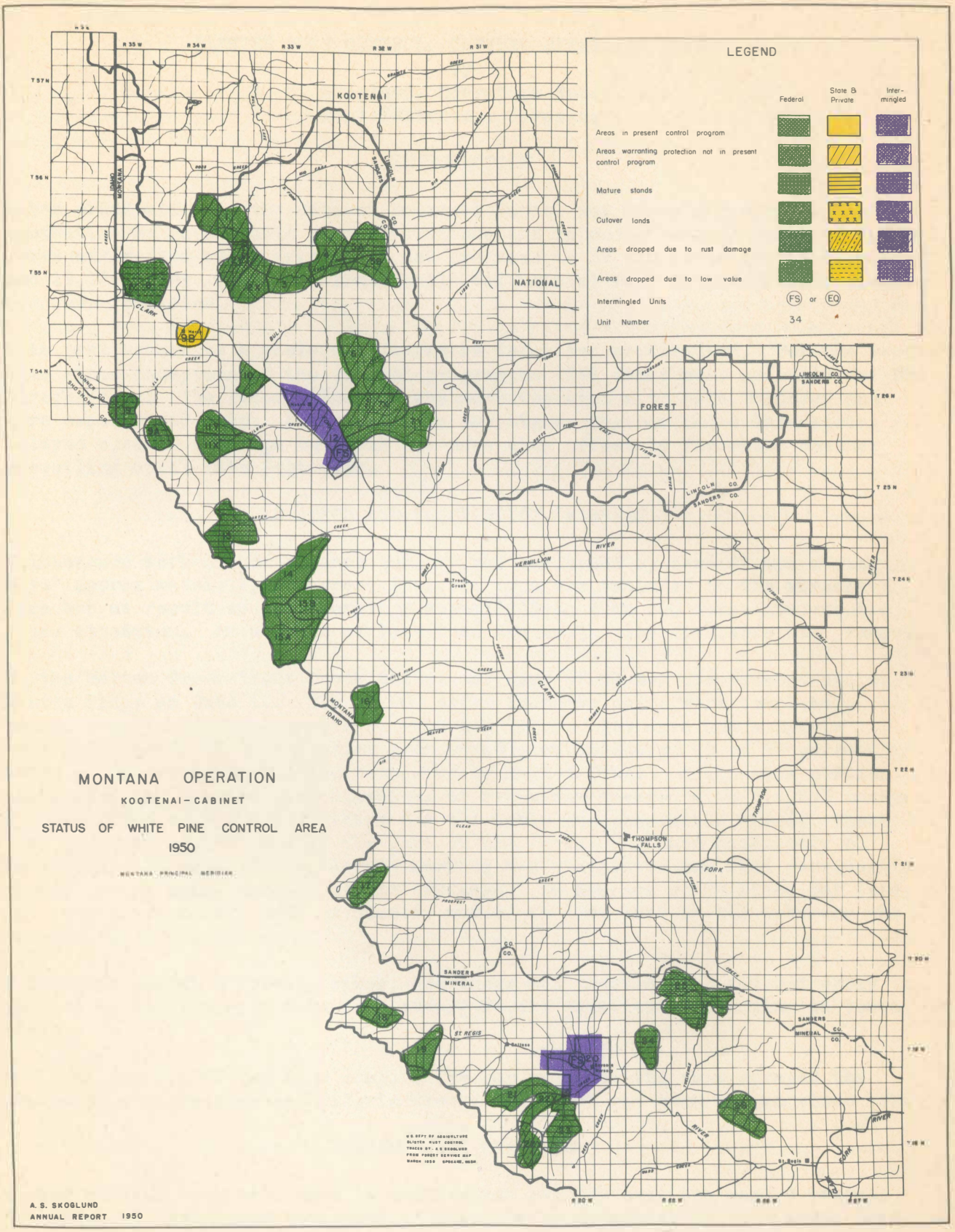
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1923-1950
KANIKSU OPERATION

State	Ownership	Net Acres in Control Area					
		Acres Worked				Acres Unworked	Total Acres
		First	Second	Other	Total		
Idaho	National Forest	181,700	55,100	8,900	245,700	54,100	235,800
	State	103,900	28,500	14,600	147,000	31,200	135,100
	Private	66,800	17,600	4,300	88,700	43,300	110,100
	Subtotal Other	170,700	46,100	18,900	235,700	74,500	245,200
	Total	352,400	101,200	27,800	481,400	128,600	481,000
Washington	National Forest	90,200	31,300	12,300	133,800	30,500	120,700
	State	2,100	100		2,200		2,100
	Private	5,100	1,900	500	7,500	3,600	8,700
	Subtotal Other	7,200	2,000	500	9,700	3,600	10,800
	Total	97,400	33,300	12,800	143,500	34,100	131,500
Total	National Forest	271,900	86,400	21,200	379,500	84,600	356,500
	State	106,000	28,600	14,600	149,200	31,200	137,200
	Private	71,900	19,500	4,800	96,200	46,900	118,800
	Subtotal Other	177,900	48,100	19,400	245,400	78,100	256,000
	Total	449,800	134,500	40,600	624,900	162,700	612,500

TABLE 8

RIBES SPECIES ERADICATED
KANIKSU OPERATION

Working	Period	Gross Acres	Ribes Species					Total Ribes
			lacustre	viscosissimum	inerme	irriguum	acerifolium	
First	1950	910	41,000	94,000				135,000
	1923-50	492,600	23,321,000	31,984,000	4,623,000	25,000	26,000	59,979,000
Second	1950	7,250	94,000	31,000	10,000			135,000
	1923-50	135,500	4,031,000	6,282,000	627,000			10,940,000
Other	1950	3,350	35,000	136,000	16,000			187,000
	1923-50	40,600	785,000	1,422,000	46,000			2,253,000
Total	1950	11,510	170,000	261,000	26,000			457,000
	1923-50	668,700	28,137,000	39,688,000	5,296,000	25,000	26,000	73,172,000



MONTANA OPERATION

KOOTENAI – CABINET

STATUS OF WHITE PINE CONTROL AREA 1950

MONTANA PRINCIPAL MERIDIAN

U.S. DEPT. OF AGRICULTURE
BLISTER RUST CONTROL
TRACED BY A.S. SKOGLUND
FROM FOREST SERVICE MAP
MARCH 1950 SPOKANE, WASH

A. S. SKOGLUND
ANNUAL REPORT 1950

BLISTER RUST CONTROL, CABINET OPERATION, 1950

By
A. S. Skoglund, Operation Supervisor
Neil Fullerton, Forester

INTRODUCTION

Ribes eradication in the Cabinet National Forest was again directed toward protection of young white pine plantations and reproduction. A total of 2,520 acres was worked which brings the net progress to 82,610 acres initially worked and 19,130 acres reworked. Practically all initial work in the present program has been completed.

This past season as a whole was favorable for ribes eradication. For the second time since inception of the control program in 1934 there were no calls for BRC firefighters. The labor situation was much improved with less turnover and more experienced help. Heavy snows in the higher regions and a late spring delayed opening of camps but this was more than offset by favorable weather prevailing until late September.

LOCATION AND DESCRIPTION OF AREAS

Maintenance work around Savenac Nursery was performed by several men during May. Approximately 1,100 acres of stream type are included in the nursery zone but as result of past workings actually less than 500 acres now require close attention. An average of less than two small ribes per acre was removed.

In the Marten Creek-Trout Creek units, one camp of 90 men was established on Minton Ridge on June 15. The 13,000 acres in these units were completely burned over in 1910 and partially reburned later. The area now supports over 8,500 acres of reproduction stands and plantations of 40 to 65 percent white pine. Initial work was completed in Marten Creek. A 150-acre portion containing the heavier concentrations of ribes was treated with 2,4,5-T sprays. All scheduled rework was finished for the Robin Run plantation areas. These 1939 plantations are some of the best in the forest and have relatively no infection. In Trout Creek, second working was started in the fine reproduction stands in the upper portion of the drainage. An average of 30 ribes per acre was removed from this area originally worked in 1940-1942 by ERA laborers who removed 500 ribes per acre.

A 245-acre parcel of brush, ribes, and snags was treated with 2,4,5-T spray applied by helicopter. This area endangers the excellent white pine on three sides.

Prior to opening of the main camp, a few men using Hi-Fog guns sprayed the stream type in Skelton and Pilgrim Creeks which had not been worked since 1934.

METHODS AND TRAINING

Marked changes have been made in eradication methods over the past 4 years. New chemical techniques have made it possible to economically work areas that were considered impractical to work a few years ago. About 45 percent of the

ribes were decapitated using 10 percent solution of 2,4,5-T and fuel oil. This was the common treatment employed in one-man lanes. Forty-five percent of the ribes were sprayed with various concentrations of 2,4,5-T using knapsack units, Hi-Fog guns, and power sprayers. At least 90 percent of the ribes were formerly removed by digging and pulling whereas this year nearly 90 percent of them were treated chemically.

A "Friend" power sprayer of 400 gallons capacity operating at 125 pounds pressure was used to furnish spray for the heavy concentrations of ribes in Marten Creek. Three-quarters of a mile of main line hose equipped with quick change connectors was laid from the power sprayer located on the road. Four lateral 300-foot spray hoses were used from the main line. A broadcast application was made on 50 acres of these heavy concentrations while a selective application was made on another 20 acres. Knapsack units were used to supplement the power sprayer by treating 40 acres of the less accessible and lighter concentrations of ribes. Spray solution was supplied to the knapsack units through the main line power spray hose by tapping it at convenient locations.

Hi-Fog guns were used to spray 50 acres of the more remotely located areas beyond the reach of hose lines. The availability of water presented no problem as the concentrate was easily back-packed to the spraymen in 5-gallon cans.

A Buffalo turbine blower was used to treat ribes and brush for several miles alongside the Minton Peak road. This unit mounted on a trailer and pulled by a truck at 2 miles per hour blasted the spray out in an airstream for a distance up to one chain depending on size and density of brush. The turbine generated a wind velocity of 145 miles per hour as the 2,4,5-T concentrate was introduced under 25 pounds pressure into the airstream. This unit appears to be effective along roads.

A helicopter equipped with two 20-foot spray booms was used to dispense a highly concentrated solution of 2,4,5-T over brush and ribes areas impractical to treat by other means. On the portion of the area without snags the pilot flew about 25 feet above the contour of the land.

All men received systematic training which included the standard one-man dragline system. Additional training was given to men assigned to spray work.

Three ribes contracts (totaling 182 acres) were awarded on Pilgrim Creek. The bid price was $2 per acre less than last year, but sufficient bidders have not been available to secure competitive bidding to reduce costs. Lay-out charges were nominal.

SAFETY

An active safety program again produced results. No accidents occurred either in the field or in camp. The straw bosses were required to eliminate all hazards or hazardous practices in their areas. This practice impressed the importance of safety upon the crews.

CHECKING AND SURVEYS

Worked areas were checked by a crew of three supervised by a checker foreman. A post check was made on the West Fork of Big Creek to plan next season's program.

Considerable time was spent in checking and rechecking of contract areas. Five checks were necessary on one contract before the area was judged satisfactory. Checking charges will have to be increased if similar rechecking is required on other contracts.

An experienced crew of two men completed stocking and disease surveys of Pilgrim Creek and East Fork of Big Creek. The results are summarized as follows:

Unit	Class	No. Chains	Total Stocking	Percent White Pine Stocking	Percent Damage
Pilgrim Cr.	1 & 2	527	Well	34	3
	3A & 3B	136	Well	5	3
E. F. Big Cr.	3A & 3B	150	Well	4	27

CONTROL STATUS

A total of 43,350 acres is now on maintenance which represents 52 percent of the worked area. Of the 2,500 acres worked this season, 920 acres were placed on maintenance, 540 acres on post check, and 1,040 acres on rework.

A survey of the 1949 spray work in White Pine Creek revealed an excellent job had been done with the knapsack and Hi-Fog guns using 2,4,5-T. A few scattered Ribes lacustre were found although additional kill may occur as the resprouts show some delayed effect of the hormone spray. No R. viscosissimum bushes were found even though some originally had over 500 feet of live stem. Initial working in this drainage should be completed next season in order to prevent any build-up of infection in the excellent white pine stands.

An analysis of all blister rust units in the forest has been completed showing relative cost of blister rust protection per thousand board feet of white pine at maturity for each unit. Factors considered in the analysis include site, stocking, age class, expected yields, present infection and damage, past costs, future protection costs, and proper timing of work. Eleven units have been selected for protection on basis of current annual appropriations. These units and relative costs of protection are as follows:

Unit Number	Unit	Yield of White Pine First Six 20-Yr. Periods	Future BRC Costs First 20-Yr. Period	Protection Costs Per M.B.F. White Pine
		M.B.F.	Man-Days	M.D./M.B.F.
15B	Robin Run	37,968	508	.046
7	McKay Creek	24,688	1,000	.055
15A	Trout Creek	94,001	3,486	.056
16	White Pine Creek	36,544	1,698	.057
11X	Skelton Creek	31,554	1,126	.059
11Y	W. F. Pilgrim Creek	23,389	1,066	.059
14	S. F. Marten Creek	49,989	1,399	.083
19	Rainy Creek	28,724	2,883	.109
22Y	Low M. F. Big Creek	13,489	1,490	.134
21	W. F. Big Creek	26,681	3,125	.151
20	Savenac Nursery	Protection of planting stock		

RESULTS

The following tables show statements of expenditures, results of the 1950 field work, and accumulative results of work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1950
CABINET OPERATION

Item	Bureau of Entomology and Plant Quarantine BLR-1-4	Forest Service BLR-4	Total
Salary perm. men	$3,039	$ 8,976	$12,015
Wages temp. laborers	3	48,763	48,766
Contract ribes erad.		1,472	1,472
Subsistence supplies		10,702	10,702
Equipment		1,526	1,526
Travel and transp.	234	2,347	2,581
Chemical		1,988	1,988
Other expense	98	2,692	2,790
Total	$3,374	$78,466	$81,840

TABLE 2

SUMMARY OF RIBES ERADICATION, 1950
CABINET OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Reproduction	1910-39	730	2,260	195,000	3.10	267
	Miscellaneous		50	220	7,000	4.40	140
	Total		780	2,480	202,000	3.18	259
Second	Reproduction	1910-39	1,160	830	45,000	.72	39
	Stream		30	10	2,000	.33	67
	Total		1,190	840	47,000	.71	39
Other	Reproduction	1910-39	50	20	500	.40	10
	Stream		480	40	1,000	.08	2
	Total		530	60	1,500	.11	3
	GRAND TOTAL		2,500	3,380	250,500	1.35	100

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	140	460	9,500
Second	40	40	40
Total	180	500	9,540

Contract work included above:

Working	Acres	Man-Days	Ribes
Second	90	220	27,000

TABLE 3

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1950
CABINET OPERATION

State	Working	Acres Worked		
		National Forest	Private	Total
Montana	First	780		780
	Second	1,170	20	1,190
	Other	180	350	530
	Total	2,130	370	2,500

TABLE 4

SUMMARY OF RIBES ERADICATION, 1935-1950
CABINET OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Cutover	1940-49							400
	Reproduction	1910-39	38,130	42,850	6,806,000	1.12	178	37,570	3,800
	Pole		25,960	9,210	1,746,000	.35	67	25,670	6,330
	Mature		9,380	4,460	1,065,000	.48	114	9,360	1,710
	Miscellaneous		4,950	2,450	603,000	.49	122	4,700	
	Stream		5,110	16,370	3,695,000	3.20	723	5,110	
	Total		83,530	75,340	13,915,000	.90	167	82,410	12,240
Second	Reproduction	1910-39	8,670	12,550	964,000	1.45	111	8,670	
	Pole		1,110	1,420	102,000	1.28	92	1,110	
	Mature		30	30	2,000	1.00	67	30	
	Miscellaneous		30	30	1,000	1.00	33	30	
	Stream		3,170	5,740	729,000	1.81	230	3,170	
	Total		13,010	19,770	1,798,000	1.52	138	13,010	
Other	Reproduction	1910-39	2,260	2,660	126,000	1.18	56	2,260	
	Pole		130	150	7,000	1.15	54	130	
	Stream		3,730	3,960	195,000	1.06	52	3,730	
	Total		6,120	6,770	328,000	1.11	54	6,120	
	GRAND TOTAL		102,660	101,880	16,041,000	.99	156	101,540	

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	930	2,740	76,100
Second	290	620	26,900
Other	70	270	4,600
Total	1,290	3,630	107,600

TABLE 5

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1928-1950
CABINET OPERATION

Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
					Man-Days	Ribes
EQ-Reg.	2,000	3,290	762,000	34,800	1.65	381
EQ-Emergency	34,320	16,290	3,840,000	1,300	.47	112
FS-Reg.	31,870	45,540	3,901,000	43,500	1.43	122
FS-Cont.	160	290	31,000		1.81	194
FS-Emergency	31,170	30,970	6,991,000	21,700	.99	224
CCC	3,140	5,500	516,000	6,300	1.75	164
Total	102,660	101,880	16,041,000	107,600	.99	156

TABLE 6

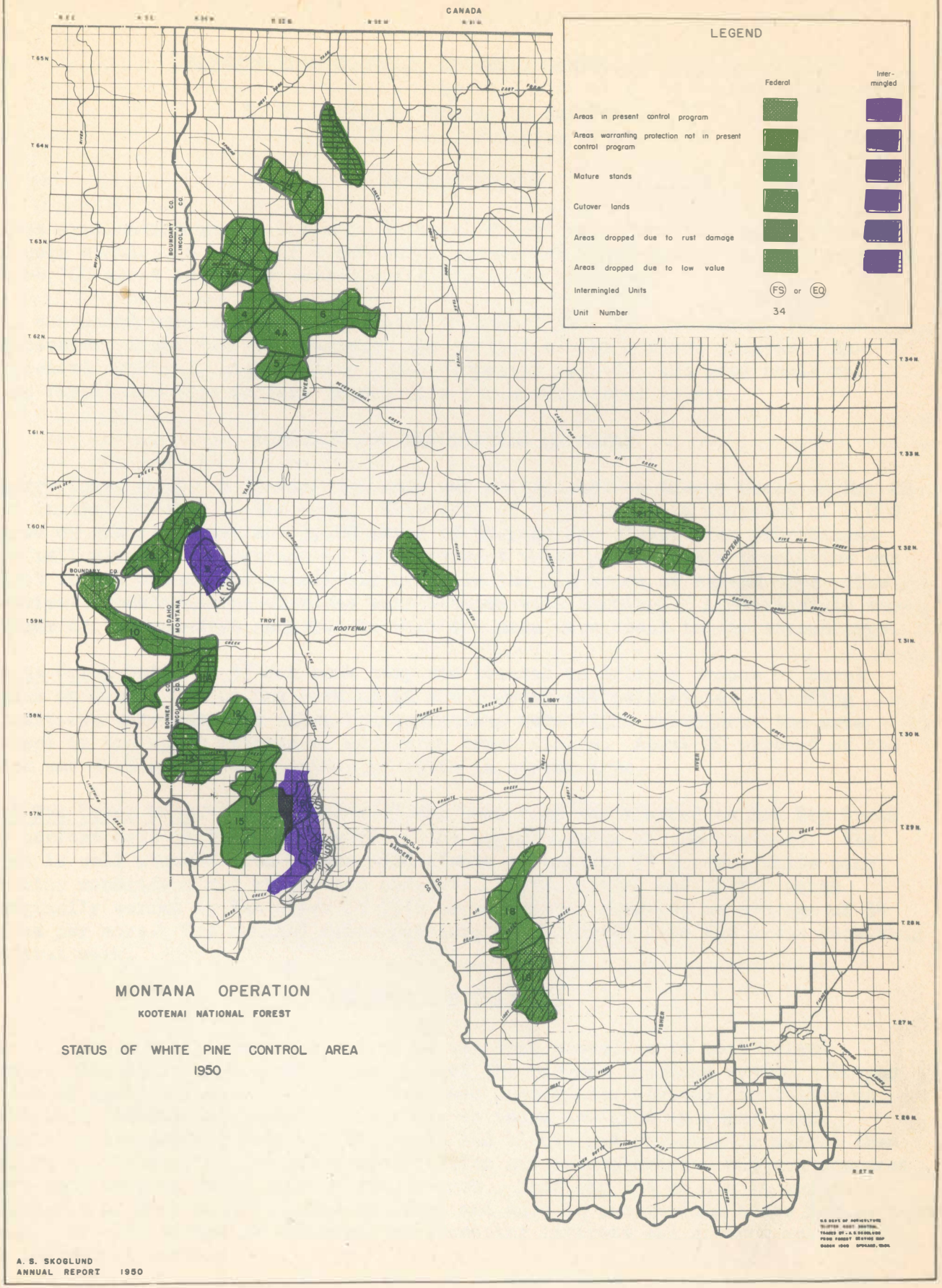
OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1928-1950
CABINET OPERATION

Ownership	Net Acres in Control Area					
	Acres Worked				Acres Unworked	Total Acres
	First	Second	Other	Total		
National Forest	67,490	10,980	3,750	82,220	8,230	75,720
Public Domain	40			40		40
Subtotal Federal	67,530	10,980	3,750	82,260	8,230	75,760
State	730			730		730
Private	14,150	2,030	2,370	18,550	4,010	18,160
Subtotal Other	14,880	2,030	2,370	19,280	4,010	18,890
Total	82,410	13,010	6,120	101,540	12,240	94,650

TABLE 7

RIBES SPECIES ERADICATED
CABINET OPERATION

Working	Period	Gross Acres	Ribes Species						Total Ribes
			lacustre	viscosissimum	petiolare	inerme	irriguum	triste	
First	1950	780	164,000	38,000					202,000
	1928-50	83,530	7,149,000	5,031,000	285,000	1,230,000	194,000	26,000	13,915,000
Second	1950	1,190	29,000	18,000					47,000
	1928-50	13,010	804,000	413,000	115,000	370,000	23,000	73,000	1,798,000
Other	1950	530		500	200	800			1,500
	1928-50	6,120	126,000	48,000	46,000	89,000		19,000	328,000
Total	1950	2,500	193,000	56,500	200	800			250,500
	1928-50	102,660	8,079,000	5,492,000	446,000	1,689,000	217,000	118,000	16,041,000


CANADA
LEGEND
Federal
Inter-mingled
Areas in present control program
Areas warranting protection not in present control program
Mature stands
Cutover lands
Areas dropped due to rust damage
Areas dropped due to low value
Intermingled Units
(FS) or (EQ)
Unit Number
34
T.65N.
T.64N.
T.63N.
T.62N.
T.61N.
T.60N.
T.59N.
T.58N.
T.57N.
T.34N.
T.33N.
T.32N.
T.31N.
T.30N.
T.29N.
T.28N.
T.27N.
T.26N.
R.27W.
BOUNDARY CO.
LINCOLN CO.
BONNER CO.
IDAHO
MONTANA
TROY
LIBBY
KOOTENAI
RIVER
MONTANA OPERATION
KOOTENAI NATIONAL FOREST
STATUS OF WHITE PINE CONTROL AREA
1950
A. S. SKOGLUND
ANNUAL REPORT 1950

BLISTER RUST CONTROL, KOOTENAI OPERATION, 1950

By
A. S. Skoglund, Operation Supervisor
M. D. Oaks, Forester

INTRODUCTION

Ribes eradication in the Kootenai National Forest was directed toward protection of pole stands. A total of 6,520 acres was worked which brings the net progress to 64,700 acres initially worked and 7,430 acres reworked.

All scheduled work was again completed by August 31. For the second year in succession, fires did not interrupt any portion of the control program. Experienced overhead, high quality labor, improved methods, and good meals and camp facilities were factors responsible for a successful season.

LOCATION AND DESCRIPTION OF AREAS

Cherry Creek Unit. A 33-man road camp was established on Cherry Creek on May 22 for initial working in the area. This unit of 4,500 acres is composed of 1,000 acres of mature timber and 3,100 acres of 50-year age class. The pole stands are well stocked and contain up to 32 percent white pine. Ribes population was light in the upland but relatively heavy in the 330 acres of stream type. The heaviest concentrations of ribes were treated with chemical. Approximately two-thirds of the man-days required to work the area were spent in the stream type.

Burnt Creek Unit. A 33-man pack camp was located on Grizzly branch of Burnt Creek on June 1 for second working in the 50-year-old pole stands. Working conditions were easy and ribes concentrations were light throughout the area except in the upper fringes of adjoining brush fields. About 20 percent of the work was confined to eradication of ribes in stream type.

Red Top Creek Unit. On June 17 a 33-man pack camp was started on Red Top Creek to perform both initial and rework in the upper portion of the drainage. The area is well stocked with 50-year-old stands containing 27 percent white pine. Working conditions and ribes were moderate. Five hundred and thirty acres originally worked by ERA crews in 1936 were reworked removing an average of 34 ribes per acre. One hundred ribes per acre were removed from the areas receiving initial work.

METHODS AND TRAINING

The one-man dragline system was used as standard procedure in most upland areas. All men were trained in the use of the one-man dragline system. Proper width of strip and technique of search were continually stressed in follow up training. Additional training was given to those assigned to spray work. Specially trained men laid out all lanes and blocks and permanently marked them for future relocation. A ribes distribution and accomplishment map was prepared from data secured under this system of work. This map was an aid in applying standards of work to the different areas and also in designating those for further work. It also served as one means of promoting interest and greater achievement by individual workers.

Areas of low ribes population on basis of advance check were worked in wide formation. Scattered ribes patches were thus located and destroyed.

A "Friend" power sprayer of 400-gallon capacity working under 175 pounds pressure was used to supply 2,4,5-T spray to concentrations of ribes along the east side of Yaak River. About 1,500 feet of main line hose was laid from the spray machine located on the opposite side of the river. A cable stretched across the river supported the main line hose. Four lateral spray hoses were used from the main line.

Hi-Fog guns were used to spray 80 acres of the heavier concentrations of ribes along Cherry and Bear Creeks. All chemical work appeared to be effective.

SAFETY

No accidents occurred in the camps. Regularly scheduled safety meetings supplemented training given at the beginning of the season. Each straw boss was delegated to search out and correct all hazards or unsafe practices. This practice served to impress upon everyone the importance of safety.

CHECKING AND SURVEYS

Four checkers completed a systematic check on all worked area. The one-man lanes were checked by lots making four diagonal courses in each 5-chain lot. A regular 4 percent strip check was made on areas worked in wide formation. Four checkers spent one week on post check in Spread Creek.

A crew of two experienced men completed stocking and disease survey work in Burnt, Crawford, and O'Brien Creeks. Results are summarized in the following analysis:

Unit	Class	Number Chains	Total Stocking	Percent White Pine Stocking	Percent Damage
Burnt Cr.	1 & 2	738	Medium	28%	1%
	3A & 3B	1,563	Well	4%	1%
Crawford Cr.	2	201	Medium	27%	3%
	3A	50	Medium	11%	0%
O'Brien Cr.	3B	520	Light	1%	55%

CONTROL STATUS

A total of 37,980 acres is now on maintenance which represents 58 percent of the worked area. Of the 6,520 acres worked this season, 5,100 acres were placed on maintenance, 720 acres on post check, and 700 acres on rework.

About 89 percent of the Cherry Creek unit was placed on maintenance after one working. Future man-day requirements should be small as ribes eradication will be required only in stream type. Infection is relatively light and confined to stream zone.

An analysis of all blister rust units in the forest has been completed showing relative cost for each unit of blister rust protection per thousand board feet of white pine at maturity. Factors considered in the analysis include site, stocking, age class, expected yields, present infection and damage, past costs, future protection costs, and proper timing of work. Seven units have been selected for protection on basis of current annual appropriations. These units with expected yields and relative costs of protection are as follows:

Unit No. & Name	Yield of WP 1st 6 20-yr. Periods M.B.F.	Future BRC Costs in First 20-yr. Period Man-Days	Future BRC Cost WP M-D/M.B.F.
4A Cyclone Cr.	10,972	205	.036
6 Burnt Cr.	58,627	3,667	.096
11 S.F. Callahan Cr.	44,990	1,815	.098
4 Red Top Cr.	20,559	1,272	.113
18 Cherry Cr.	25,939	2,676	.129
10 N.F. Callahan Cr.	24,406	3,448	.137
15 Spar Lake	41,499	1,090	.149

A large volume of timber was blown down as a result of a freak wind storm in November 1949. This blowdown ranged in size from several acres to several sections and was scattered throughout the entire forest. No appreciable damage has been found by aerial or ground crews in any of the white pine units.

RESULTS

The following tables show statements of expenditures, results of the 1950 field work, and accumulative results of work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1950
KOOTENAI OPERATION

Item	Bureau of Entomology and Plant Quarantine BLR-1-4	Forest Service BLR-4	Total
Salary perm. men	$3,039	$19,468	$22,507
Salary temp. men		9,209	9,209
Wages temp. laborers	3	35,537	35,540
Subsistence supplies		17,783	17,783
Equipment		6,403	6,403
Travel and transp.	234	4,076	4,310
Chemical		258	258
Other expense	98	2,877	2,975
Total	$3,374	$95,611	$98,985

TABLE 2

SUMMARY OF RIBES ERADICATION, 1950
KOOTENAI OPERATION

Working	Eradication Type	Year of Origin	Acres	Man-Days	Ribes	Per Acre	
						Man-Days	Ribes
First	Cutover	1940-49	200	40	1,000	.20	5
	Pole		3,360	400	28,000	.12	8
	Mature		940	120	6,000	.13	6
	Stream		360	780	126,000	2.17	350
	Total		4,860	1,340	161,000	.28	33
Second	Pole		1,300	1,170	69,000	.90	53
	Stream		140	200	32,000	1.43	229
	Total		1,440	1,370	101,000	.95	70
Other	Pole		110	30	1,000	.27	9
	Stream		110	90	11,000	.82	100
	Total		220	120	12,000	.55	55
GRAND TOTAL			6,520	2,830	274,000	.43	42

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	90	180	1,400
Second	10	20	600
Other	10	20	700
Total	110	220	2,700

TABLE 3

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1950
KOOTENAI OPERATION

State	Working	Acres Worked		
		National Forest	Private	Total
Montana	First	4,330	530	4,860
	Second	1,440		1,440
	Other	220		220
	Total	5,990	530	6,520

TABLE 4

SUMMARY OF RIBES ERADICATION, 1935-1950
KOOTENAI OPERATION

Working	Eradication Type	Year of Origin	Gross Acres Worked	Man-Days	Ribes	Per Acre		Net Acreage Remaining	
						Man-Days	Ribes	Worked	Unworked
First	Plantation	1940-49	240	120	6,000	.50	25	240	
	Cutover	1940-49	200	40	1,000	.20	5	200	6,370
	Cutover	1920-39	1,270	770	55,000	.61	43	1,270	3,650
	Reproduction	1910-39	13,830	9,660	1,136,000	.70	82	13,070	9,680
	Pole		28,200	12,630	1,219,000	.45	43	27,150	15,330
	Mature		18,260	4,970	684,000	.27	37	16,840	15,340
	Miscellaneous		350	90	8,000	.26	23	350	
	Stream		4,320	13,250	1,807,000	3.07	418	3,920	
	Total		66,670	41,530	4,916,000	.62	74	63,040	50,370
Second	Plantation	1940-49	240	180	3,000	.75	13	240	
	Cutover	1920-39	320	260	10,000	.81	31	320	
	Reproduction	1910-39	1,440	1,310	94,000	.91	65	1,440	
	Pole		3,330	2,850	146,000	.86	44	3,330	
	Mature		230	200	21,000	.87	91	230	
	Stream		1,700	3,140	187,000	1.85	110	1,470	
	Total		7,260	7,940	461,000	1.09	63	7,030	
Other	Pole		250	300	11,000	1.20	44	250	
	Stream		150	130	17,000	.87	113	150	
	Total		400	430	28,000	1.08	70	400	
GRAND TOTAL			74,330	49,900	5,405,000	.67	73	70,470	

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	260	580	18,800
Second	30	40	3,300
Other	10	30	1,000
Total	300	650	23,100

TABLE 5

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1935-1950
KOOTENAI OPERATION

Class	Gross Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre	
					Man-Days	Ribes
EQ-Emergency	31,750	14,490	1,935,000		.46	61
FS-Reg.	26,700	23,820	2,137,000	23,100	.89	80
FS-Emergency	4,540	4,650	377,000		1.02	83
CCC	11,340	6,940	956,000		.61	84
Total	74,330	49,900	5,405,000	23,100	.67	73

TABLE 6

OWNERSHIP OF LAND COVERED ON RIBES ERADICATION, 1935-1950
KOOTENAI OPERATION

Ownership	Net Acres in Control Area					
	Acres Worked				Acres Unworked	Total Acres
	First	Second	Other	Total		
National Forest	59,340	6,480	400	66,220	39,890	99,230
State					170	170
Private	3,700	550		4,250	10,310	14,010
Subtotal Other	3,700	550		4,250	10,480	14,180
Total	63,040	7,030	400	70,470	50,370	113,410

TABLE 7

RIBES SPECIES ERADICATED
KOOTENAI OPERATION

Working	Period	Gross Acres	Ribes Species					Total Ribes
			lacustre	viscosissimum	inerme	irriguum	coloradense	
First	1950	4,860	159,000	2,000				161,000
	1935-50	66,670	3,886,000	513,000	422,000	39,000	56,000	4,916,000
Second	1950	1,440	92,000	3,000	6,000			101,000
	1935-50	7,260	402,000	25,000	33,000		1,000	461,000
Other	1950	220	5,000		7,000			12,000
	1935-50	400	19,000	1,000	7,000		1,000	28,000
Total	1950	6,520	256,000	5,000	13,000			274,000
	1935-50	74,330	4,307,000	539,000	462,000	39,000	58,000	5,405,000

BLISTER RUST CONTROL, MOUNT RAINIER NATIONAL PARK, 1950

By
J. C. Gynn, Operation Supervisor
C. M. Chapman, Pathologist

Blister rust control work in Mount Rainier National Park was confined to the Longmire-Silver Forest areas. The National Park Service supervised and administered the project. The Bureau of Entomology and Plant Quarantine furnished the technical supervision.

Ribes eradication. Acres worked, 630; man-day per acre, .57; ribes per acre, 41. A superintendent, a checker, and eight laborers were employed. Work started June 12 and ended September 9. Training charts were used to introduce all methods of ribes eradication and to illustrate procedures for maximum efficiency and production. Actual field training included search and identification of ribes, use of chemical equipment, spraying techniques, and instruction in the one-man dragline system. All stream type ribes were sprayed with 2,4,5-T using manually-operated trombone pumps and Hi-Fog guns. Nearly all upland types were worked using the one-man dragline method. Patches of seedlings occurring in "Hell's Half Acre" were broadcast sprayed with 2,4,5-T.

Checking and control status. A systematic check was made of the entire Longmire-Silver Forest control unit. From checking data, a new map was compiled based on surveyed section corner locations found in the vicinity of Longmire. It was determined from the new map that the Longmire-Silver Forest control unit contains 1,300 acres rather than 900 as previously reported. Accumulative tables have been adjusted accordingly. After checking 1950 work, the unit was classified for control status as follows: maintenance, 930 acres; rework, 370 acres. Classification of the White River area remains unchanged.

Blister rust infection. In the Longmire portion of the control unit, western white pine reproduction was found to be 37.9 percent infected. In the Silver-Forest portion, white pine reproduction was found to be 23.9 percent infected. Outside the control unit between and adjacent to both portions of the area, white pine reproduction was found to be 91.4 percent infected. An analysis of the data gathered indicates control of the disease is being effected and the perpetuation of white pine in the protection unit can be maintained for many years.

RECOMMENDATIONS

Longmire-Silver Forest. No additional work until 1952.

White River. The following recommendations are made for the 1951 ribes eradication program: a superintendent (GS-6), a checker (GS-5), and eight laborers for a 3-month period beginning approximately June 11. Using the one-man dragline method, work the areas in the vicinity of Sunrise and Rock Crusher Points, as indicated by the control status map. Using both hand and chemical methods, work that portion of the area between the White River campground road and Sunrise Park unfinished in 1949.

RESULTS

The following tables show statements of expenditures, results of the 1950 field work, and accumulative results of work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1950
MOUNT RAINIER NATIONAL PARK

Item	National Park Service
Personal Services	$10,408.76
Communication Service	2.66
Contractual Services	519.73
Supplies & Materials	140.81
Total	$11,071.96

TABLE 2

SUMMARY OF RIBES ERADICATION, 1950
MOUNT RAINIER NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species: Ribes lacustre	Ribes bracteosum	Ribes laxiflorum	Ribes acerifolium	Total Ribes	Gallons Spray 2,4,5-T	Per Acre: Man-Days	Per Acre: Ribes
Longmire-Silver Forest	Other	630	360	6,000	1,000	11,000	8,000	26,000	270	.57	41

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
Other	120	130	270

TABLE 3

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1930-1950
MOUNT RAINIER NATIONAL PARK

Class	Gross Acres	Net Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre: Man-Days	Per Acre: Ribes
NP-Reg.	12,720	12,710	12,280	1,157,000	3,640	.97	91
NP-CCC	10,960	6,600	12,690	1,293,000		1.16	118
Total	23,680	19,310	24,970	2,450,000	3,640	1.05	103

TABLE 4

SUMMARY OF RIBES ERADICATION, 1930-1950
MOUNT RAINIER NATIONAL PARK
(NET CONTROL AREA)

Area	Working	Acres	Man-Days	Ribes Species: Ribes lacustre	Ribes viscosissimum	Ribes bracteosum	Ribes watsonianum	Ribes laxiflorum	Ribes acerifolium	Total Ribes	Gallons Spray	Per Acre: Man-Days	Per Acre: Ribes
Longmire-Silver Forest	First	1,300	1,600	226,000		99,000		59,000	9,000	393,000		1.23	302
	Second	1,290	800	31,000		24,000		2,000	3,000	60,000		.62	47
	Other	3,700	4,850	95,000		21,000		16,000	51,000	183,000	370	1.31	49
	Total	6,290	7,250	352,000		144,000		77,000	63,000	636,000	370	1.15	101
White River	First	3,200	3,160	378,000	85,000	5,000	141,000	11,000	12,000	632,000		.99	198
	Second	3,010	2,810	85,000	22,000	2,000	7,000	16,000	5,000	137,000		.93	46
	Other	6,810	3,340	97,000	20,000	11,000	14,000	28,000	7,000	177,000	3,270	.49	26
	Total	13,020	9,310	560,000	127,000	18,000	162,000	55,000	24,000	946,000	3,270	.72	73
All Areas	First	4,500	4,760	604,000	85,000	104,000	141,000	70,000	21,000	1,025,000		1.06	228
	Second	4,300	3,610	116,000	22,000	26,000	7,000	18,000	8,000	197,000		.84	46
	Other	10,510	8,190	192,000	20,000	32,000	14,000	44,000	58,000	360,000	3,640	.78	34
	Total	19,310	16,560	912,000	127,000	162,000	162,000	132,000	87,000	1,582,000	3,640	.86	82

Note: Resurvey added 400 acres to First and Second Working in Longmire-Silver Forest.

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
Second	60	60	180
Other	540	610	3,470
Total	600	670	3,650

BLISTER RUST CONTROL, GLACIER NATIONAL PARK, 1950

By
J. C. Gynn, Operation Supervisor
C. M. Chapman, Pathologist

The 1950 white pine blister rust control work was confined to the Two Medicine area as previously scheduled. Snow remaining in the area delayed starting ribes eradication work until June 20. A return to the 40-hour week necessitated employing additional men.

Ribes eradication. Acres worked, 480; man-day per acre, .83; ribes per acre, 50. A superintendent and eight crewmen were employed for a 3-month period. Although nearly the entire crew had previous experience in the work, intensive training was given each man. Training charts depicting all methods and procedures of ribes eradication were used in conjunction with instruction on the job. Stream type ribes and seedling patches were sprayed with 2,4,5-T using trombone pumps and Hi-Fog guns. The one-man dragline method was most applicable for eliminating the scattered ribes in the upland.

Checking and control status. A check on the area was made in advance of ribes eradication to determine location of ribes bushes and work limits. The eradication work was checked daily and any necessary mop up done accordingly. The final check made to determine status of control resulted in the Two Medicine area being classified as follows: maintenance, 550 acres; post check, 140 acres; rework, 17 acres.

Blister rust infection. Random inspections indicated the amount of infection inside and outside the control unit has remained about the same as reported in the 1948 annual report. Damage to infected Pinus flexilis on this area is light. Nearly all infections found were limb cankers that will not kill the trees.

RECOMMENDATIONS

East Glacier. Perform checking and rework according to plan. For a 3-month period beginning about June 11, a superintendent (GS-6), a checker (GS-5), and nine crewmen should be employed.

Oldman Lake. If a spring inspection shows a mop up job to be necessary in the heavy ribes concentrations sprayed in 1949, it is recommended four or five men be borrowed from the East Glacier project to perform the work.

RESULTS

The following tables show statements of expenditures, results of the 1950 field work, and accumulative results of work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1950
GLACIER NATIONAL PARK

Item	National Park Service
Personal Services	$6,944.03
Travel & Transportation	64.90
Communication Service	3.91
Rents	178.30
Contractual Services	22.04
Supplies & Materials	472.08
Equipment	10.25
Total	$7,695.51

TABLE 2

SUMMARY OF RIBES ERADICATION, 1950
GLACIER NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species: Ribes lacustre	Ribes Species: Ribes viscosissimum	Ribes Species: Ribes setosum	Total Ribes	Gallons Spray 2,4,5-T	Per Acre: Man-Days	Per Acre: Ribes
Two Medicine	Other	480	460	19,000	4,000	1,000	24,000	280	.83	50

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
Other	60	70	280

TABLE 3

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1939-1950
GLACIER NATIONAL PARK

Class	Acres	Man-Days	Total Ribes	Gallons Spray 2,4,5-T	Per Acre: Man-Days	Per Acre: Ribes
NP-Reg.	6,400	7,700	745,000	3,750	1.20	116
NP-CCC	2,630	2,830	324,000		1.08	123
NP-CPS	2,780	2,290	214,000		.82	77
Total	11,810	12,820	1,283,000	3,750	1.09	109

TABLE 4

SUMMARY OF RIBES ERADICATION, 1939-1950
GLACIER NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species: Ribes lacustre	Ribes Species: Ribes viscosissimum	Ribes Species: Ribes setosum	Ribes Species: Ribes inerme	Total Ribes	Gallons Spray	Per Acre: Man-Days	Per Acre: Ribes
Park Headquarters	First	690	450	33,000	43,000	33,000		109,000		.65	158
	Second	620	200	3,000	3,000	1,000		7,000		.32	11
	Other	700	380	7,000	5,000	3,000		15,000		.54	21
	Total	2,010	1,030	43,000	51,000	37,000		131,000		.51	65
Two Medicine	First	710	1,240	74,000	4,000	6,000	23,000	107,000		1.75	151
	Second	680	740	85,000	2,000	5,000	34,000	126,000		1.09	185
	Other	850	740	71,000	6,000	1,000	12,000	90,000	280	.87	106
	Total	2,240	2,720	230,000	12,000	12,000	69,000	323,000	280	1.21	144
Lake McDonald	First	1,780	1,200	43,000	4,000	36,000		83,000		.67	47
	Second	1,780	1,080	29,000	16,000	19,000		64,000		.61	36
	Other	1,210	850	13,000	1,000	2,000		16,000		.70	13
	Total	4,770	3,130	85,000	21,000	57,000		163,000		.66	34
East Glacier	First	440	1,290	46,000	15,000	12,000	112,000	185,000		2.93	420
	Second	390	720	37,000	6,000	30,000	2,000	75,000		1.85	192
	Other	290	450	28,000	1,000	7,000	1,000	37,000	30	1.55	128
	Total	1,120	2,460	111,000	22,000	49,000	115,000	297,000	30	2.20	265
Oldman Lake	First	1,520	3,260	341,000	1,000	3,000		345,000	3,290	2.14	227
	Second	150	220	24,000				24,000	150	1.47	160
	Total	1,670	3,480	365,000	1,000	3,000		369,000	3,440	2.08	221
All Areas	First	5,140	7,440	537,000	67,000	90,000	135,000	829,000	3,290	1.45	161
	Second	3,620	2,960	178,000	27,000	55,000	36,000	296,000	150	.82	82
	Other	3,050	2,420	119,000	13,000	13,000	13,000	158,000	310	.79	52
	Total	11,810	12,820	834,000	107,000	158,000	184,000	1,283,000	3,750	1.09	109

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	120	460	3,290
Second	40	30	150
Other	80	110	310
Total	240	600	3,750

BLISTER RUST CONTROL, YELLOWSTONE NATIONAL PARK, 1950

By
J. C. Gynn, Operation Supervisor
C. M. Chapman, Pathologist

The Yellowstone National Park white pine blister rust control operation is composed of the following units: Mammoth Hot Springs, Mount Washburn, and Craig Pass. The Mammoth and Craig Pass areas will require only a minimum of future work to maintain control standards. The 1950 ribes eradication program was confined to the Mount Washburn area as previously scheduled.

Mount Washburn. The work plan was designed to complete initial work on 400 acres remaining in the protection zone and do rework on the 1946 and 1947 workings determined necessary by checking and control status data. Results were as follows: acres first working, 390; acres second working, 770; average man-days per acre, 1.09; average ribes per acre, 191. Ten acres of initial cliff work remaining in the area will be done more economically in 1951 when crews are in the immediate vicinity. A superintendent, a checker, and 24 crewmen were employed. Work started June 20, continuing through September 7. A late spring delayed leaf development making recognition of ribes difficult. Snowfields spotting the area hindered ribes eradication procedures and necessitated piecemeal working as the snow melted. Nearly all proven methods of ribes eradication were used. Stream type ribes were sprayed with 2,4,5-T, using manually-operated pumps. Hi-Fog guns were employed for spraying ribes in the high, rugged cliff areas at Dunraven Peak where melting snow furnished the small quantities of water needed for the concentrated solutions. Heavy ribes concentrations of initial work in upland types were treated with 2,4,5-T using Hi-Fog guns in conjunction with the dragline method. An abnormally large number of current year ribes seedlings occurred on 156 acres of south-facing slopes below Mount Washburn and Dunraven Pass in the 1946 and 1947 working. These areas were treated by broadcast spraying the seedling beds with 2,4,5-T. Late season inspections indicate the treatment was entirely successful.

Checking and control status. After checking, the 1,160 acres worked in 1950 were classified as follows: Maintenance, 440 acres; post check, 660 acres; rework, 60 acres. Rework area was so classified because of heavy original ribes population. The post check classification includes all chemical broadcast work as ribes survival cannot be definitely determined until the year following treatment.

A post check on 1,300 acres of the Mount Washburn unit initially worked in 1947 and 1948 resulted in 660 acres maintenance and 640 acres rework.

A post check on 450 acres of the Mammoth unit resulted in 210 acres of maintenance and 240 acres of rework. Nearly all areas classified for rework by the 1950 post check can be brought to maintenance standards at a low cost. The 9,600 acres comprising the three Yellowstone National Park blister rust control units are now classified for control status as follows: Maintenance, 6,890 acres; post check, 920 acres; rework, 1,780 acres; unworked, 10 acres.

Blister rust infection. For the first time, blister rust infection was found on white pine within the park boundaries. The infection was on a small Pinus

flexilis or P. albicaulis in the Slide Lake Creek drainage approximately 3 miles northwest of Mammoth Hot Springs. Ribes infection was found for the first time in the Lamar River drainage. The infection was on Ribes petiolare near the Cooke City highway crossing at Crystal Creek. No infection has been found in the park south of this location.

Conclusion. The Yellowstone National Park white pine blister rust control program is being performed on schedule as outlined in the 1948 annual report. Small adjustments of previously estimated man-day requirements will be necessary for the elimination of ribes seedlings in 1947 and 1948 workings. Blister rust infection is invading the unprotected white pine stands in the northern portion of the park. Eventually the disease will be generally distributed throughout the southern portion of the park as well. It is highly essential necessary rework be performed on schedule in order to maintain the healthy infection-free control units of white pine desired.

RECOMMENDATIONS

Mammoth. No additional work before 1952.

Craig Pass. In 1951, perform ribes eradication on the 60 acres classified for rework.

Mount Washburn. In 1951, perform all necessary rework of Carnelian Creek stream type. Complete initial work on the 10 acres of cliffs remaining in the area. Using the one-man dragline and chemical broadcast methods, perform all rework shown as necessary by the 1950 post check.

The following 1951 estimate is made to accomplish the work: For a complete 3-month period beginning approximately June 11, 1951, a crew composed of 1 superintendent GS-6, 1 checker GS-5, and 13 crewmen is recommended.

RESULTS

The following tables show statements of expenditures, results of the 1950 field work, and accumulative results of work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1950
YELLOWSTONE NATIONAL PARK

Item	National Park Service
Personal Services	$18,421.35
Travel & Transportation	75.23
Communication Service	11.03
Contractual Services	731.03
Supplies & Materials	2,838.13
Equipment	742.50
Salary, Checker	1,045.86
Total	$23,865.13

TABLE 2

SUMMARY OF RIBES ERADICATION, 1950
YELLOWSTONE NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species: Ribes lacustre	Ribes Species: Ribes viscosissimum	Ribes Species: Ribes montigenum	Total Ribes	Gallons Spray 2,4,5-T	Per Acre: Man-Days	Per Acre: Ribes
Mount Washburn	First	390	650	83,000	1,000	45,000	129,000	5,130	1.67	331
	Second	770	610	11,000		81,000	92,000	820	.79	119
	Total	1,160	1,260	94,000	1,000	126,000	221,000	5,950	1.09	191

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	140	360	5,130
Second	170	130	820
Total	310	490	5,950

TABLE 3

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1945-1950
YELLOWSTONE NATIONAL PARK

Class	Acres	Man-Days	Total Ribes	Gallons Spray	Per Acre: Man-Days	Per Acre: Ribes
NP Reg.	10,500	8,640	1,277,000	17,090	.82	122
NP-CPS	1,570	990	96,000	760	.63	61
Total	12,070	9,630	1,373,000	17,850	.80	114

TABLE 4

SUMMARY OF RIBES ERADICATION, 1945-1950
YELLOWSTONE NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species: Ribes lacustre	Ribes Species: Ribes viscosissimum	Ribes Species: Ribes petiolare	Ribes Species: Ribes inerme	Ribes Species: Ribes setosum	Ribes Species: Ribes cereum	Ribes Species: Ribes montigenum	Total Ribes	Gallons Spray	Per Acre: Man-Days	Per Acre: Ribes
Mammoth	First	1,580	1,040	9,000	2,000	19,000		63,000	12,000		105,000	1,650	.66	66
	Second	1,480	560	6,000	2,000	8,000		55,000	4,000		75,000	730	.38	51
	Other	150	210			4,000		13,000	2,000		19,000	410	1.40	127
	Total	3,210	1,810	15,000	4,000	31,000		131,000	18,000		199,000	2,790	.56	62
Mount Washburn	First	4,690	6,780	454,000	21,000	22,000	33,000			528,000	1,058,000	14,240	1.45	226
	Second	850	650	12,000	1,000					81,000	94,000	820	.76	111
	Total	5,540	7,430	466,000	22,000	22,000	33,000			609,000	1,152,000	15,060	1.34	208
Creig Pass	First	3,320	390	8,000	3,000		2,000			9,000	22,000		.12	7
All Areas	First	9,590	8,210	471,000	26,000	41,000	35,000	63,000	12,000	537,000	1,185,000	15,890	.86	124
	Second	2,330	1,210	18,000	3,000	8,000		55,000	4,000	81,000	169,000	1,550	.52	73
	Other	150	210			4,000		13,000	2,000		19,000	410	1.40	127
	Total	12,070	9,630	489,000	29,000	53,000	35,000	131,000	18,000	618,000	1,373,000	17,850	.80	114

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	400	1,190	15,890
Second	180	170	1,550
Other	10	30	410
Total	590	1,390	17,850

BLISTER RUST CONTROL, ROCKY MOUNTAIN NATIONAL PARK, 1950

By
J. C. Gynn, Operation Supervisor
C. M. Chapman, Pathologist

The Rocky Mountain National Park white pine blister rust control program was initiated in 1950 as planned by officials of the National Park Service and the Bureau of Entomology and Plant Quarantine. The 6,000-acre area selected for protection is a good control unit supporting an excellent stand of limber pine (Pinus flexilix). It is a high, rugged terrain transected by the highly used trails to Long's Peak, Storm Pass, Sprague Lake, and the Glacier Basin campground. The area is surrounded to a large extent by natural protection barriers. Nearly ribes-free dense stands of lodgepole pine form the east and north boundaries with the high, barren ridges of Mount Lady Washington and Battle Mountain on the west side. The deep, rugged canyon of Roaring Fork is the south boundary.

Ribes eradication. Acres worked, 3,200 which include 500 acres of private ownership in the protection zone; man-day per acre, .73; ribes per acre, 71. Work started June 12 and ended September 16. A superintendent, a checker, and 36 crewmen were employed. The one-man dragline system was used wherever feasible in upland types. Stream type ribes were treated with 2,4,5-T using manually-operated pumps. The Hi-Fog gun spraying of ribes intermingled with prostrate growths of white pine, fir, and mountain birch reduced man-day expenditures for the entire area nearly .3 man-day per acre below original estimates. The long, steep climb to the 11,000 and 12,000 ft. elevations and thinner air at these altitudes necessitated modifying usual procedures. More time was allowed for rest periods and walking to and from the job. Rough composition-soled shoes rather than caulked boots were worn for safety on boulder fields and rocky slopes. Daily rain showers at the higher elevations made work disagreeable and more than usual mop up work was necessary.

Checking and control status. Prior to working, a systematic advance check was run on the area. To increase efficiency, a flanker was used to assist the checker in his search for ribes. From these data portions of the area were determined as nearly ribes free and deleted from intensive crew work. By using men specially trained for these light ribes areas, maintenance standards were achieved at low cost. After checking the 1950 work, it was classified for control status as follows: maintenance, 2,100 acres; post check, 400 acres; rework, 700 acres. A systematic advance check was run on all portions supporting light ribes populations in the unworked half of the control unit. Results show several hundred acres as being nearly ribes free.

Test plots. Eight chemical basal stem test plots were established August 14 in Rocky Mountain National Park. The purpose of the tests is to determine the susceptibility of Ribes cereum in this area to 2,4,5-T mixed with diesel oil when applied only to basal stems and root crown, the most efficient economical ratio of chemical dilution, and the most satisfactory equipment for basal stem work. If the test plots show the method is successful in this region, R. cereum concentration can be eliminated at reduced costs in 1951.

RECOMMENDATIONS

Initial ribes eradication was completed on a little over half the control unit in 1950. For completing initial work on the remaining portion of the control unit, the following estimate is made: for a full 3-month period starting approximately June 11, a superintendent (GS-6), a checker (GS-5), 2 foremen (GS-5), and 33 crewmen will be required.

Chemical work should be started as early as possible in the R. montigenum concentration on the north side of Battle Mountain when water is available from melting snow. Other work should start adjacent to 1950 working, progressing north and west as the work plan and field maps indicate.

RESULTS

The following tables show statements of expenditures, results of the 1950 field work, and accumulative results of work performed to date:

TABLE 1

CLASSIFIED EXPENDITURES, CALENDAR YEAR 1950
ROCKY MOUNTAIN NATIONAL PARK

Item	National Park Service
Personal Services	$24,957.59
Travel & Transportation	57.08
Rents	774.60
Contractual Services	58.85
Supplies & Materials	1,751.75
Equipment	1,960.71
Salary, Checker	1,151.69
Salary, Supt. & Foremen	3,271.66
Total 1950	$33,983.93
Total 1948	2,894.91
Total 1949	8,255.86
GRAND TOTAL	$45,134.70

TABLE 2

SUMMARY OF RIBES ERADICATION, 1950
ROCKY MOUNTAIN NATIONAL PARK

Area	Working	Acres	Man-Days	Ribes Species					Total Ribes	Gallons Spray 2,4,5-T	Per Acre	
				Ribes lacustre	Ribes setosum	Ribes cereum	Ribes coloradense	Ribes montigenum			Man-Days	Ribes
Longs Peak-Estes Cone	First	3,200	2,350	2,000	38,000	7,000	18,000	163,000	228,000	3,840	.73	71

Chemical work included above:

Working	Acres	Man-Days	Gallons Spray
First	230	780	3,840

TABLE 3

SUMMARY OF RIBES ERADICATION BY CLASSES OF CAMPS, 1950
ROCKY MOUNTAIN NATIONAL PARK

Class	Acres	Man-Days	Total Ribes	Gallons Spray 2,4,5-T	Per Acre	
					Man-Days	Ribes
NP-Reg.	3,200	2,350	228,000	3,840	.73	71

DEVELOPMENTAL WORK IN METHODS OF RIBES ERADICATION AND PROGRESS OF RIBES ECOLOGY AND DISEASE CONTROL STUDIES IN THE NORTHWESTERN REGION FOR 1950

By
V. D. Moss, Forest Ecologist; R. T. Bingham, Pathologist;
and H. R. Offord, Pathologist

CONTROL INVESTIGATIONS 1923-50: ACCOMPLISHMENTS AND FUTURE WORK

Blister rust control investigations (now known as D. & I. project W-a.14) have been in progress in white pine forest areas of the Western States since 1923. From 1923 to 1950 three to seven employees (for most of this period, three for the Northwestern Region and three for the Pacific Coast Region) have been concerned with the special problems assigned to control investigations. In 1934 the D. & I. project was organized along its present lines within the Bureau of Entomology and Plant Quarantine.

D. & I. and operations' personnel work closely together, and by the time new methods and equipment have reached the stage of extensive testing in the field they represent the thought and joint efforts of all Blister Rust Control technicians. Lowering costs and improving effectiveness of the protection of white pine are continuous interests of all Blister Rust Control employees. The lot system of crew work employing draglines and development and extensive use of contract ribes eradication were developed by operations' personnel. These procedures have lowered control costs on a broad gauge basis. The D. & I. group collaborates with research personnel of other Federal and State agencies. Cooperation given by the University of California, the University of Idaho, the U. S. Forest Service, and the Bureau of Plant Industry, Soils and Agricultural Engineering has greatly facilitated blister rust control investigations.

The cost of D. & I. work from 1923 through 1950 has been about $357,000 chargeable to regular appropriations of Bureau of Plant Industry (1922-33), and Bureau of Entomology and Plant Quarantine (1934-50). Control investigations have both direct and indirect values. Direct values can be shown in man-days saved on some 30,000 acres of heavy ribes sprayed with herbicides during the past 20 years. By comparison with grubbing and depending upon ribes population, spray methods have saved from 2 to 10 man-days for each acre sprayed. Other special methods such as decapitation or basal stem treatment of troublesome individual bushes, and special tools for hand and power eradication of ribes, application of herbicides by aircraft, slashing and dynamiting of large clumps of ribes, the effective use of ribes ecology data in pine management and in the timing of ribes eradication, and controlled burning have made significant savings. Many of these methods are difficult to evaluate because they have been integrated with regular pulling and grubbing procedures. Indirect values are to be found in the flexibility of the control program made possible by a backlog of fundamental data on all phases of ribes suppression. Changes in items such as funds available for control work, type of labor available, weather conditions affecting rust development, the scope of logging in white pine areas, land management policies, and even the progress of ribes suppression itself call for a continuous and critical appraisal of recommendations for effective blister rust control.

The principal categories of control investigations are:

A. Development and improvement of physical, chemical, and mechanical methods of ribes eradication.

B. Ribes ecology in relation to control work and white pine management.

C. Disease studies related to control status.

D. Development of rust resistant white pine.

The D&I group has been concerned primarily and has had full responsibility for laboratory, greenhouse, and field tests relating to categories A. and B. Special phases of categories C. and D. have been undertaken in cooperation with blister rust operations' personnel and with Forest Pathology (BPISAE) and the U. S. Forest Service. Cooperative work developing rust resistant white pine for the Western States is of recent origin, having been started for Pinus monticola in the Northwestern Region in 1949. Similar work will be started with P. lambertiana when trees of apparent high resistance to rust are found.

Detailed results of investigations in the four categories just named appear in 27 annual reports, 146 special reports (carrying the designation Serial Nos. 1-146), 4 public service patents, and 34 published reports in U.S.D.A. bulletins and outside technical journals. The accomplishments and needs of control investigations for categories A, B, C, and D (Northwestern Region), and categories A and B (Pacific Coast Region) are highlighted in the pages that follow. For greater detail on purpose, status, work needed, estimated date of completion, assignments and references, see "Status of Blister Rust Control Investigations in 1949" (September 26, 1949, H. R. Offord).

A. Development and Improvement of Physical, Chemical, and Mechanical Methods of Ribes Eradication

Status: Successful chemical methods have been developed for the destruction of ribes through (1) sprays applied to the foliage, (2) application of dry or liquid chemical to the crowns of woody type plants after cutting off the tops, and (3) application of an oil-toxicant concentrate to the basal stems of intact plants. When field conditions have warranted, these methods have been used on 18 species of ribes in California, Colorado, Idaho, Montana, Oregon, Washington, and Wyoming. Herbicides tested and then used in operations work 1923-50 in chronological order of their acceptance and use are: sodium chlorate, sodium chlorate and borax dry mixture, oil, borax and common salt dry mixture, ammonium thiocyanate, ammonium sulfamate, 2,4-D, and 2,4,5-T. Where necessary, fire retardants, wetting agents, penetrants, and markers have been developed and used with these toxicants. The use of chemicals created many problems involving equipment, crew methods, and hazards to woods workmen, wild life, and associated plants. These were solved by devising suitable field procedures and adapting knapsack and portable power sprayers, truck-mounted power sprayers, mist blowers, containers for transporting dry and liquid chemicals, and tools for decapitating plants. Most standard equipment had to be modified for effective use in rugged forest terrain.

Helicopters equipped with conventional spray boom and with a thermal fogging device were tested experimentally in California (1948 and 1950) and in Idaho (1949 and 1950). During the 1950 season, about 1,500 acres of forest land were sprayed by

helicopter in north Idaho and western Montana with the following objectives: (1) to desiccate brush and ribes as a pretreatment for prescribed broadcast burning, (2) to kill ribes and brush, and (3) to suppress brush as a competitor of white pine and ponderosa pine in plantations. The cost of this helicopter spraying varied between $5 and $10 per acre.

Special hand and power tools have been devised and used for ribes suppression. In 1930 work was begun on a brush rake to equip a crawler tractor (bulldozer) for uprooting dense thickets of brush and ribes. From 1931-44, bulldozer methods employing brush rakes mounted in place of the conventional dozer blades were used in Idaho stream type and in California stream type and upland brush fields to clear land of ribes and brush. In north Idaho many of these waste areas were then sown to forage crops and converted into permanent meadows. The crops produced on these areas more than paid for the cost of the work and removed the ribes hazard to adjacent valuable white pine stands. Specially designed 5- and 6-tooth ribes grapples were operated from a logging winch mounted on the rear end of the California dozer unit. The blister rust brush rake was the forerunner of bulldozer brush-clearing attachments that are now manufactured and widely used throughout the country. During the early years of blister rust control work, many types of hand tools were tested as an aid in uprooting ribes. Since 1938 a claw mattock (also called a forked pick or a pronged tool) has been in general use by the crews doing grubbing work. Grubbing has been the method used for over 90 percent of the ribes eradication work. Thus, the greater speed and efficiency that have resulted from the use of the claw mattock are expecially noteworthy. Under certain conditions dynamite and fire have been used to lower costs of ribes suppression.

All improvements in physical, chemical, and mechanical eradication of ribes are utilized in making administrative and operations decisions on control standards, contract procedures, white pine management in relation to natural suppression of ribes, and the long-range economics of rust control work.

Needs: More readily translocated and more selective herbicides are needed that will permit safe and effective broadcast application of toxicants to ribes associated with pine by ground equipment and by aircraft. Rapid methods of treating ribes on cutover land by power mist blowers and by aircraft are now under test. All developments in backpack and power equipment including spray accessories of all types must be evaluated for adaptability to control work. The chemico-ecological suppression of ribes by low cost repeated treatment from aircraft carrying fogging devices and other units for low volume dispersal of toxicants are being explored. Practical methods and effective schedules for respray work must be further developed. Lowered protection costs are being sought through integration of chemical methods and pine management directed toward a small annual charge for ribes suppression to the necessary control standards. Chemicals and chemical methods have now largely supplanted blasting and power machinery for mechanical eradication of ribes. It appears that power and hand tools now available for the mechanical eradication of ribes should meet foreseeable needs.

B. Ribes Ecology in Relation to Control Work and White Pine Management

Status: Effective and economical control of white pine blister rust has necessitated a thorough working knowledge of the occurrence and growth of ribes in forest stands. Ribes ecology studies are important because: (1) the eradication of all ribes bushes within a control unit would by no means end the control problem because of numerous stored seed in the forest floor mantle, (2) every natural aid possible must be employed by timber management to destroy stored seed and as many ribes bushes as possible, and (3) the objectives of timber management and blister rust control must be in harmony if white pine is to be grown economically in spite of the disease.

Basic strategy in ribes suppression is to exhaust the stored seed supply and destroy existing ribes to prevent their spreading the disease and producing more seed. The development of forest practices which would contribute to this objective was jointly undertaken by the Forest Service and the Bureau of Entomology and Plant Quarantine. The results of this cooperative project were made public in Station Paper No. 3, "Blister Rust Control in the Management of Western White Pine," June 1940, Northern Rocky Mountain Forest and Range Experiment Station. This paper is now being revised and will be published within the next few months.

Three natural factors employed to destroy stored seed and ribes bushes are fire, sunlight, and canopy shade. Fire by consuming the organic mantle down to mineral soil destroys stored seed and ribes bushes. Sunlight by desiccating the organic soil mantle devitalizes stored ribes seed. Canopy shade is employed to destroy ribes plants through lack of sufficient sunlight for photosynthesis. The way these natural factors are used in timber management practices to destroy stored seed and ribes bushes is explained under separate headings.

Fire - Prescribed broadcast burning is the most effective means of destroying stored seed and ribes bushes. Its effectiveness is dependent upon the intensity of burn. A fire which consumes the organic mantle down to mineral soil destroys practically all ribes seed along with existing bushes. Burns of less intensity destroy stored seed in the proportion to which fire consumes the organic mantle down to mineral soil. A fire which consumes just the layer of litter destroys about 60 percent of the stored seed; if the litter and duff layers are burned, about 73 percent of the stored seed is destroyed, and when the entire organic mantle is consumed down to mineral soil by fire it destroys about 99 percent of the stored ribes seed. The only seed to survive heavy burning is that stored in very moist sites.

On the thousands of acres where broadcast burning has been prescribed, no appreciable ribes eradication problem has been encountered. To achieve successful results, burning must be undertaken before the heavy fall rains so that fire will consume the organic mantle down to mineral soil. Planting of these areas must be delayed until the second or third year after burning to permit the removal of any ribes. In the future, it seems highly probable that ribes on these areas will be sprayed by helicopter at a cost ranging between $5 and $10 per acre. By comparison with ground methods, this will amount to a significant reduction in costs and probably in number of workings.

Sunlight - The heat of sunlight by desiccating the organic soil mantle devitalizes stored ribes seed. This reaction is induced by partial cutting of many timber stands to destroy stored seed before making the final or harvest cutting. Partial cutting is about as successful a measure of destroying stored seed by devitalization as fire is in consuming the organic mantle down to mineral soil. A timber stand is clearcut in preparation for broadcast burning only when its physical condition is beyond hope of partial cutting. Overmature stands of defective western hemlock and/or grand fir and western red cedar are rarely adaptable to partial cutting unless these species alone are to be reproduced.

Some ribes seed remains viable throughout the life of a forest stand. This is primarily because of the favorable storage environment comprised of adequate soil moisture and low temperature in the organic soil mantle. When any portion of the timber canopy is removed by logging, these favorable storage conditions for ribes seed are adversely affected causing its devitalization. Where many hundreds of ribes per acre have germinated from the disturbance of the first logging operation in partial cutting, practically none have occurred from new ground disturbances following the second cutting made after a period of 15 to 20 years. Partial cutting involves making two and sometimes three separate cuttings spaced 15 to 20 years apart retaining sufficient canopy to suppress ribes seedlings and discourage the establishment of white pine reproduction. It is not until making the harvest cutting that favorable conditions are established for the natural regeneration of white pine. Over the span of years from first cutting to harvest cutting most of the ribes seed will have been futilely germinated or destroyed by devitalization.

Canopy shade - Without adequate sunlight for photosynthesis, ribes seedlings are unable to persist in forest stands. Consequently, canopy shade in partial cutting becomes an important way of destroying ribes seedlings. Ribes seedlings germinate as a result of any forest activity such as logging and fire which disturbs or consumes the organic soil mantle. They are unavoidable following logging operations in initial cuttings of timber stands. However, the number surviving to the age where they become a ribes eradication problem can be materially reduced by canopy shade in regulating the intensity of partial cutting.

The influence of partial cutting methods on the occurrence and growth of ribes depends upon the degree to which the forest canopy is opened, extent of mechanical disturbance to the forest floor by logging, and the use of fire in slash disposal. Two degrees of partial cuttings are practiced in the western white pine type: very light cuttings and light to moderate cuttings. Very light cuttings leave residual stands permitting between 20 and 30 percent of full sunlight to reach the forest floor. In well stocked stands, up to about one-third of the total board foot volume can usually be removed without creating an exposure greater than 30 percent full sunlight. In light to moderate cuttings a residual stand is retained permitting between 30 and 50 percent of full sunlight to reach the forest floor. In well stocked stands, from 30 to 40 percent of the total board foot volume is removed in first cutting. By one or more partial cutting, most of the stored seed can be devitalized by altering soil climate while employing canopy shade of the residual stand to suppress most of the ribes seedlings germinating from the ground disturbance caused by logging and the use of fire in slash disposal.

Needs: Further field studies in ribes ecology are needed to amplify and keep pace with developments in timber management practices in western white pine type. Broadcast spraying of cutover land by ground rigs and by aircraft introduces new types of disturbances to ribes and associated vegetation that must be fully understood. As the habits and habitats of ribes become more precisely defined the planning of blister rust control work will become more exact and more economical. Control work needed for the second rotation under pine management and applied ribes ecology should be a relatively low cost operation.

C. Disease Studies Related to Control Status

Status: Regulatory and control aspects of disease study have been undertaken by the Blister Rust Control Office since 1923. These activities, which include scouting and disease survey, are distinct from the research on the pathogen Cronartium ribicola that has been a responsibility of Forest Pathology (BPISAE). In the western white pine region, the establishment of priorities under the working unit system required close appraisal of both the losses in pine stocking caused by the rust and the status of control as shown by the rust development on specified areas. New disease survey methods were designed to provide data on rust damage based on the depopulation of stocked quadrats; these methods developed in 1946 and 1947 included improved field technique for recognizing damaging branch cankers. Methods of sampling and accuracy of data were tested in the field prior to large-scale use in 1948 and 1949 in order to obtain the greatest amount of information at the required level of accuracy. Survey training schools were held during 1948 and 1949 at which some 60 men were trained to carry on the disease survey work which subsequently involved about 3,000 miles of survey strip sampling some 200 white pine units. From the accumulated data of this survey, largely completed by 1950, rust development over the region was classified according to control status as being protected (on maintenance), as partially protected (post check and rework classes), or as unprotected (unworked). Regional stocking inventories derived from this survey data showed that 0- to 80-year-old pine areas now on maintenance support about 5 billion board feet of potential white pine saw timber valued at $65 million (at conservative stumpage price of $13 per M). Another 7 billion board feet of potential timber remains in partially protected young stands where it is being lost to the rust at the rate of about 2½ percent per year. Rate of damage in unprotected stands was 5 to 10 percent per year.

Needs: Blister rust losses in advanced pole and mature stands of the western white pine region have become increasingly apparent in the past few years. Problems of salvage cuttings are of great importance and must be related to the rate of development of rust cankers in large diameter stems. Plots have recently been established in pole class timber to establish criteria which might be used conveniently from the ground to gauge canker development and tree mortality. Sampling methods and tree climbing will be needed in the appraisal of damage in the mature class trees where cankers cannot readily be seen from the ground. These studies plus some further work in determining the damage caused by small ribes constitute the important future needs in this category. For the direct control of the rust, the use of aircraft and ground rigs for applying fungicides and selective toxicants should be explored along the following lines: (1) Repeated defoliation and systemic damage of ribes at times best calculated to prevent production of

sporidia. (2) Selective killing of cankered pine in heavy infection centers. Results of broadcast spraying of cutover land with 2,4,5-T indicated that cankered white pine were killed or damaged more readily than healthy trees. (3) Direct killing of cankers, of aecia, and of airborne rust spores by fungicides. (4) Protection of foliage of natural pine regeneration and plantation pine by broadcast application of fungicides. Continued study is needed to detect host plant disease relationships that might affect control work such as new races of the rust.

D. Development of Rust-Resistant White Pine

Status: A cooperative study on the selection, breeding, propagation and testing of rust-resistant white pines was activated in 1949 by joint effort of the Bureau of Entomology and Plant Quarantine, U. S. Forest Service, and Bureau of Plant Industry, Soils and Agricultural Engineering. Emphasis is now being placed on western white pine (P. monticola) in north Idaho but plans have been discussed to include sugar pine (P. lambertiana) as soon as resistant individuals can be located. Work now under way in the Western States has been based in part on preliminary results obtained at the University of Wisconsin and State College of Forestry at Syracuse, N.Y. where rust-resistant specimens of P. strobus have been under test for several years. Promising white pine hybrids developed by California Forest and Range Experiment Station at the Placerville Institute of Forest Genetics and tested at Rhododendron, Oregon, by Forest Pathology, have shown significantly greater resistance to rust than the native parent trees.

In north Idaho during 1950 some 600 controlled pollinations, representing 82 different crosses, were made among 25 previously located and apparently highly resistant white pines of cone-bearing age. About 80 of these crosses appeared by the end of the season to have been successful. In the vegetative propagation of resistant P. monticola, no success has been achieved to date in the rooting of cuttings. Grafting has been about 75 percent successful and has already supplied considerable material for nursery and outplanting tests. Open pollinated seed from 21 of the resistant trees was collected in the fall of 1950 and the seed extracted. For outplantings, five test plots (each 5-7 acres) were selected and agreed upon by principal cooperators; four of these on National Forest land in north Idaho and western Montana have been cleared of timber and brush for outplanting of resistant pines. All plots are on good sites and all are exposed to moderate to heavy natural rust.

Needs: Tentative schedules of necessary work for the continuation of this project through 1960 by the several cooperating agencies have been prepared. F_1 progeny of 1950 and 1951 controlled pollinations, and open pollinations from resistant trees will be compared with controls in the outplanting areas. Grafted stock from resistant trees will be maintained for use in early seed production of F_1 progeny, if the F_1 progeny from controlled pollination among field selections shows significantly improved resistance over native controls. The usual procedures are planned for testing and back-crossing of F_1 and F_2 progeny. The advantages of having white pine planting stock of improved resistance to rust for further rehabilitation of top quality pine site require no explanation. The development of rust-resistant white pine is a long term activity requiring the cooperation of several Federal and State agencies. These studies must be correlated with those of Dr. Stakman and associates at the University of Minnesota on the identification of possible new races of the rust.

DEVELOPMENT AND IMPROVEMENT OF PHYSICAL, CHEMICAL, AND MECHANICAL METHODS OF RIBES ERADICATION

Results of New Herbicidal Tests in 1949

Tests made in 1947 and 1948 with substituted phenoxy weedkillers demonstrated that 2,4,5-T was less specific in its toxicity to ribes than 2,4-D. All species of ribes can be killed with 2,4,5-T through coverage of leaves and stems plus supplementary wetting of the root crown. With aqueous sprays, the minimum effective concentration of the ester of 2,4,5-T is 500 ppm on sensitive ribes such as Ribes petiolare but for the majority of species a concentration of at least 2,000 ppm of 2,4,5-T is necessary for a satisfactory kill. In comparison with 2,4-D the toxic action of 2,4,5-T is slower and less affected by the growth stage of ribes, by age of plants, weather, soil type, time of day when applied, and competition from other plants. The slow killing action of 2,4,5-T is most clearly shown in the case of mid-season and late fall treatments. The extent of damage to ribes sprayed about mid-July will rarely be evident until the following growing season; 2,4,5-T has a strong residual or delayed toxicity which is manifest the following growing season. Often, ribes that survive the initial treatment and produce sprouts from stems or root crown will die back the next growing season from the effects of 2,4,5-T.

Because 2,4-D is cheaper than 2,4,5-T, considerable effort was made in 1949 to test combination sprays of 2,4-D and 2,4,5-T as a substitute for straight 2,4,5-T. The results of these tests are shown in Table 1. The satisfactory bush kill obtained with 1,000 ppm of 2,4,5-T (plots 9 and 19, Coeur d'Alene National Forest) is in marked contrast to the relative low percent bush kill obtained with the combination spray. These results confirm data from 1948 tests showing that the combination of 2,4-D with 2,4,5-T interferes with the essential toxicity of 2,4,5-T on R. lacustre and R. viscosissimum. As shown in Table 1, 2,4,5-T in a combination spray with 2,4-D failed to produce results comparable to straight 2,4,5-T in equivalent (or in fact in lower) concentration. On the basis of the acid equivalent of the two materials, the combination spray is therefore more expensive than the straight 2,4,5-T on ribes species resistant to 2,4-D. About the only possibility for economic use of a mixture of 2,4-D and 2,4,5-T would be in the treatment of the single species R. petiolare which is susceptible to both phenoxy weedkillers.

Of the many sites in the region where chemical methods tests have been established none has offered greater difficulty in obtaining a satisfactory kill of ribes than a particular portion of the LaClerc Creek drainage in the Kaniksu National Forest. The site is at the head of the drainage on a severe southwest exposure. The soil is shallow, underlaid with granite, and quite porous by reason of decomposed granite. Ribes on this exposure are very woody, having a thick and tough layer of bark. Leaves often become leathery early in July and bushes may commence to defoliate by the middle of August. In contrast with ribes growing under a normal environment (Coeur d'Alene National Forest), the Kaniksu tests reveal a wider spread of results between the combination spray and straight 2,4,5-T. This indicates a strong response to the characteristics of 2,4-D and the tendency of the combination to interfere with the essential toxicity of 2,4,5-T. Consequently like 2,4-D, the combination is more specific in its toxicity to ribes than 2,4,5-T and results of bush kill could be expected to vary by growth stage and age of

ribes, soil type, weather, and by competition from other plants.

Four basal stem plots were established in the Coeur d'Alene National Forest, September 23, 1949. The combination 2,4-D and 2,4,5-T spray was applied to plots 35 and 36, and the straight 2,4,5-T to plots 37 and 38. Diesel oil was used as a diluent in the treatment of all four plots. Basal stem treatment limits the application of spray to the root crown and all stems to about 1 foot in height above the ground surface. The possible advantages of basal stem treatment over the conventional spraying of foliage, stem and root crown method appears to be (1) a faster way of treating a bush, (2) the use of less chemical solution, and (3) its effectiveness in the fall season after bushes are defoliated, or early in the spring before bushes are fully foliated. Basal stem work should show to greatest advantage in treating large, erect ribes occurring in rough terrain, remote from roads, or where the distance between ribes results in excessive handling of hose and travel time of the nozzleman. In California and Oregon where this type of treatment has been adopted under the conditions just noted, a 5 percent strength of either 2,4-D or 2,4,5-T ester in an oil diluent is presently recommended. With tests in the Coeur d'Alene of 1/2 of 1 percent and 1 percent 2,4,5-T acid equivalent, results are not too discouraging. Additional work on basal stem treatment in testing various strengths of 2,4,5-T and spray equipment was done this season in the Clearwater. These are reported under the section "Herbicides Tested in 1950."

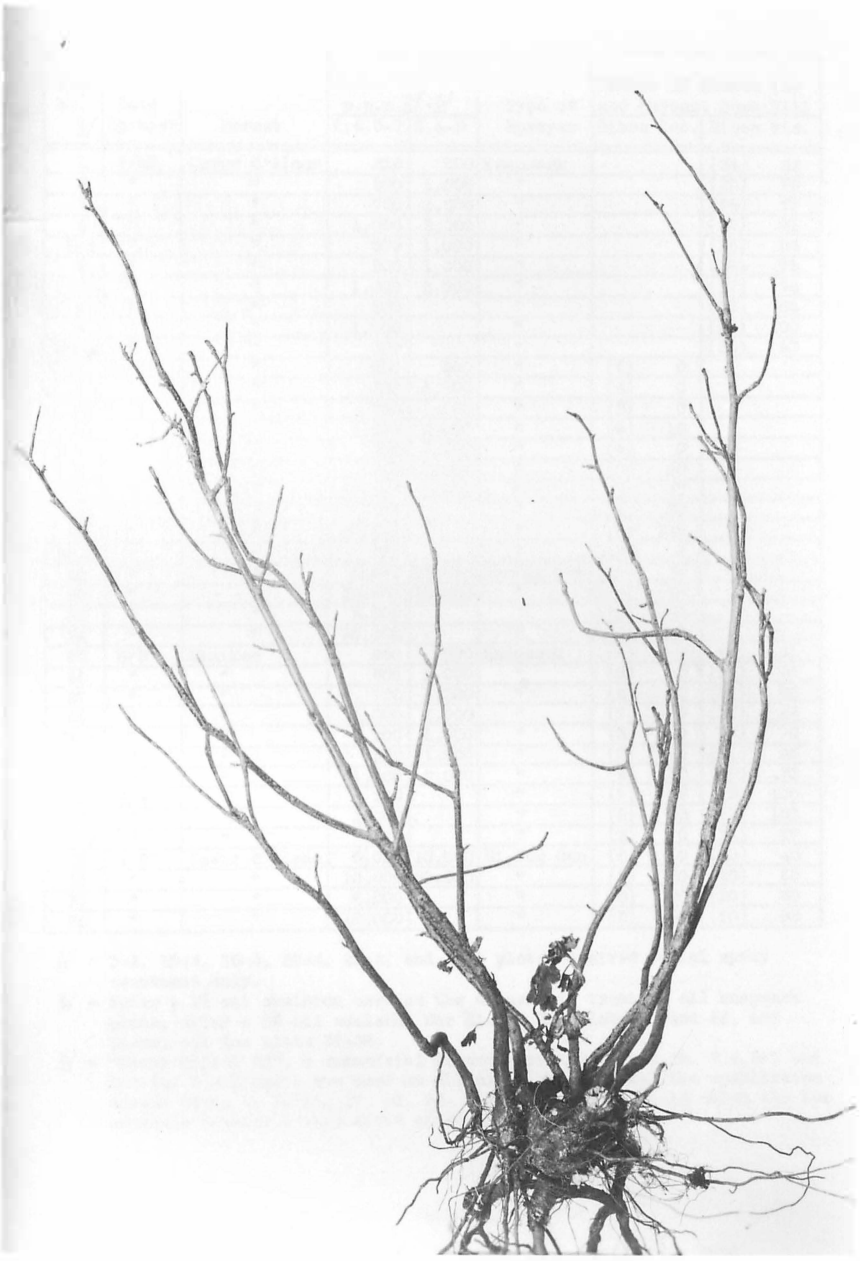
The results in applying 2,4,5-T by helicopter on Windfall Peak, Coeur d'Alene National Forest in 1949 are shown in Table 2. These 12 2-acre plots were sprayed toward the latter part of June with 6 plots being sprayed with the isopropyl ester of 2,4,5-T in Diesel oil and the remainder with the isopropyl ester of 2,4,5-T in water plus the addition of 10 percent oil emulsion as a sticker and spreader. A 10 percent check in mid-September of 1950 was made by running two strips longitudinally through each plot. A check line was followed over the identical course of one made in 1949 to record the numbers and size classes of ribes and white pine. Thus the results of the various treatments are derived from differences in tally of live bushes between the number of ribes in 1949 and the number living at the close of the 1950 growing season. Bushes dead in 1950 were not used as a basis for calculating bush kill because stems of seedlings cannot often be found the season after treatment; also, it is often difficult to distinguish mature ribes bushes by dead stems from other species of brush.

No advantage was found in using Diesel oil or stove oil as a diluent of 2,4,5-T over the use of water plus oil emulsion. The latter gave as good or better results than Diesel oil, costs much less, and greatly reduces the amount of foliage damage to white pine and other species of conifers. For the range in dosage used, the amount of 2,4,5-T acid applied per acre (1, 2, and 3 lbs.) did not result in any significant differences in the percent of bushes killed. The factor that does have a striking influence upon results is the amount of spray solution applied per acre. In comparing equal amounts of 2,4,5-T acid applied per acre, about twice as good a bush kill was obtained from use of 10 gallons of diluent per acre as from 5 gallons. This holds true also in applying low concentrations of 2,4,5-T by ground equipment. The percent of bush kill will increase with increase in the amount of spray solution applied per acre up to the point of a drenching type treatment.

The high percentage of seedling ribes killed in applying 2,4,5-T by helicopter is noteworthy. When the helicopter tests were undertaken, seedlings were considered the only age class of ribes susceptible to aerial application. Previous tests on seedlings with ground equipment showed that they could be killed from spraying only leaves and stems. Considering the fact that many seedlings were heavily screened by fireweed and a limited number of other annual weeds, the high percent kill obtained with the dosage rate of 10 gallons per acre was much better than anticipated. Bush kill resulting from the 10 gallons per acre treatment is generally about double that from the 5-gallon. When applied with 10 gallons of diluent per acre, one pound of 2,4,5-T acid per acre was as effective as 2 or 3 pounds.

It was thought unlikely that mature bushes could be killed by a single aerial application because ground experience had shown consistently poor results (especially with R. lacustre) unless the spraying of the aerial portion of a bush was accompanied by the wetting of the root crown. The kill of a few mature bushes by this initial treatment is therefore encouraging when measured against the potentialities of one or more respray jobs. Differences in the degree of susceptibility to 2,4,5-T of the two ribes species is striking for aerial treatment of mature bushes. Of the two species, R. viscosissimum is the one more likely to be successfully killed in applying 2,4,5-T by helicopter on respray because of its greater degree of susceptibility to the chemical. Photograph W-741 is a fairly typical bush of R. viscosissimum selected from a portion of helicopter plot 8 (2 lbs. 2,4,5-T acid equivalent in 10 gallons of water per acre). Note the amount of dead stem from initial treatment and that the bush is resprouting from the base stems. It seems likely that bushes damaged in this manner would be quite susceptible to respray as late as the second year following initial treatment.

Four of the Windfall Peak plots were resprayed in 1950; all received the equivalent of 1 pound of 2,4,5-T acid per acre in an aqueous solution containing 1 percent oil emulsion. Dosages of 5 gallons per acre were applied to plots 4 and 8, with plots 1 and 11 getting 10 gallons per acre. This respray work was done in early July. The photograph of the R. viscosissimum bush (W-741) taken about the middle of September, shows the amount of systemic damage to resprouts from respray treatment. These four plots will be examined in 1951 to determine just how successful a respray the first season after initial treatment will be on releafing and resprouting R. lacustre and R. viscosissimum bushes.



W-741

Ribes viscosissimum bush showing the amount of dead stem resulting from initial treatment in applying 2,4,5-T by helicopter in 1949 on Windfall Peak, Coeur d'Alene National Forest. Also shown are resprouts occurring in 1950, and the systemic damage to resprouts resulting from respraying by helicopter in 1950. Plot received on initial treatment 2 lbs. of 2,4,5-T acid equivalent per acre in 10 gallons of spray solution per acre. On respray, 1 lb. of 2,4,5-T acid per acre was applied in 5 gallons of solution per acre.

TABLE 1

COMPARATIVE RESULTS OF SPRAY TESTS MADE IN 1949 BETWEEN THE COMBINATION SPRAY 2,4,5-T AND 2,4-D WITH STRAIGHT 2,4,5-T ON R. LACUSTRE AND R. VISCOSISSIMUM

Plot No. 1/	Date Sprayed	Forest	p.p.m. 2/, 3/ 2,4,5-T	2,4-D	Type of Sprayer	Number of Bushes (5) and Percent Bush Kill Ribes lac.		Ribes vis.	
1	7/28	Coeur d'Alene	250	500	Knapsack			(34)	62
2	"	"	500	1,000	"			(20)	70
3	"	"	750	1,500	"			(26)	77
4	"	"	1,000	2,000	"			(32)	91
5-A	"	"	500	1,000	"			(16)	56
6	"	"	500	1,000	"			(38)	76
7	"	"	1,000	2,000	"			(17)	94
8	"	"	500		"			(29)	86
9	"	"	1,000		"			(21)	100
10-A	"	"	500		"			(35)	63
11	7/29	"	250	500	"	(6)	0		
12	"	"	500	1,000	"	(4)	0		
13	"	"	750	1,500	"	(5)	0		
14	"	"	1,000	2,000	"	(8)	12		
15-A	"	"	500	1,000	"	(9)	0		
16	"	"	500	1,000	"	(5)	40		
17	"	"	1,000	2,000	"	(9)	67		
18	"	"	500		"	(6)	83		
19	"	"	1,000		"	(8)	100		
20-A	"	"	500		"	(5)	0		
21	"	"	5,000	10,000	Hi-Fog Gun	(10)	30		
22	"	"	10,000	20,000	"	(10)	70		
23	"	"	5,000		"	(10)	90		
24	"	"	10,000		"	(10)	100		
25	8/3	Kaniksu	250	500	Knapsack	(6)	0	(9)	11
26	"	"	500	1,000	"	(8)	0	(14)	36
27	"	"	750	1,500	"	(4)	0	(11)	45
28	"	"	1,000	2,000	"	(7)	0	(11)	64
29-A	"	"	500	1,000	"	(3)	0	(7)	0
30	"	"	500	1,000	"	(3)	0	(11)	45
31	"	"	1,000	2,000	"	(9)	33	(12)	75
32	8/4	"	500		"	(7)	29	(5)	100
33	"	"	1,000		"	(8)	75	(7)	100
34-A	"	"	500		"	(3)	0	(11)	27
35	9/23	Coeur d'Alene	5,000	10,000	Hi-Fog Gun	(5)	0	(20)	45
36	"	"	10,000	20,000	"	(5)	20	(20)	65
37	"	"	5,000		"	(5)	20	(20)	60
38	"	"	10,000		"	(5)	60	(20)	85

1/ = 5-A, 10-A, 15-A, 20-A, 29-A, and 34-A plots received aerial spray treatment only.

2/ = Water + 1% oil emulsion used as the diluent in treating all knapsack plots, water + 5% oil emulsion for Hi-Fog Gun plots 21 and 22, and Diesel oil for plots 35-38.

3/ = "Brush Killer 32", a commercial mixture containing 1/3 lb. 2,4,5-T and 2/3 lb. 2,4-D/gal., was used on all plots sprayed with the combination except plots 6, 7, 16, 17, 21, 22, 30, 31, 35, and 36, in which the two separate chemicals were field mixed.

TABLE 2

RESULTS IN APPLYING 2,4,5-T BY HELICOPTER ON WINDFALL PEAK, COEUR D'ALENE NATIONAL FOREST IN 1949

Plot No.	Dosage/Acre Gals. Spray	Pounds 2,4,5-T Acid	1/ Diluent	Total Number of Bushes Per Acre and Percent of Bushes Killed: Seedlings R. lac. No.	%	R. vis. No.	%	Total No.	%	Mature Bushes R. lac. No.	%	R. vis. No.	%	Total No.	%	Seedlings & Mature R. lac. No.	%	R. vis. No.	%	Total No.	%
5	5	1	Oil	185	57	20	50	205	56	115	9	30	17	145	10	300	38	50	30	350	37
2	5	2	"	210	45	25	60	235	47	155	10	10		165	9	365	30	35	43	400	31
3	5	3	"	245	51	15	67	260	52	105	14	20		125	12	350	40	35	29	385	39
1	10	1	"	370	99	15	100	385	99	260	35	15	33	275	35	630	72	30	67	660	72
6	10	2	"	230	98	45	100	275	98	95	21	70	43	165	30	325	75	115	65	440	73
4	10	3	"	220	100	30	100	250	100	140	39	35	43	175	37	360	76	65	69	425	75
10	5	1	Water	60	42	115	57	175	51	125	13	65	15	180	14	175	23	180	42	355	32
7	5	2	"	20	50	240	52	260	52	30	17	110	14	140	14	50	30	350	40	400	39
11	5	3	"	140	57	345	58	485	58	170	12	240	17	410	15	310	32	585	41	895	38
9	10	1	"	35	100	210	100	245	100	55	36	185	57	240	52	90	61	395	80	485	76
8	10	2	"	95	100	360	99	455	99	65	38	255	51	320	48	160	75	615	79	775	78
12	10	3	"	165	97	180	100	345	99	130	31	90	56	220	39	295	68	270	85	565	75

1/ = Plots 1-6 sprayed with the isopropyl ester of 2,4,5-T in Diesel oil, and plots 7-12 with the isopropyl ester of 2,4,5-T in water with 10% oil emulsion.

Herbicides Tested in 1950

With the satisfactory development of 2,4,5-T for the eradication of ribes, attention in 1950 was directed mainly toward the improvement of power sprayer equipment and techniques in spraying. This project was undertaken jointly with the Bureau Clearwater Operation to evaluate (1) various types of spray nozzles for power spraying, (2) handling of hose lines equipped with quick-coupling Hansen or Foster fittings, (3) broadcast spraying of cutover lands, (4) effectiveness of different concentrations of 2,4,5-T in relation to dosages of spray solution per acre, (5) the development of training methods and spraying techniques, (6) a schedule for respray treatment, and (7) the effect of broadcast spraying on the ecology of ribes and white pine on recent and older cutover lands.

Separate test areas were chosen for seedling or young ribes and for mature bushes. Twelve 2-acre plots were established on the ribes seedling area in Breakfast Creek, and sixteen 1-acre plots on the mature ribes bush area in Reed's Creek. The age of ribes on the Breakfast Creek area was 4 years and younger. The majority of mature bushes on the Reed's Creek area was from 7 to 9 years of age. A heavy type of partial cutting had been practiced on both areas with slash disposed of by pile and burn measures. The preponderance of brush cover on both areas was ribes. Other conditions such as unburned slash, cull logs, windfalls, and ground cover were considered representative of cutover lands in the Clearwater Forest. The only variation from a general condition on cutover was the unusually high ribes population. It was fortunate to find two areas on which both R. lacustre and R. viscosissimum were well distributed and in large numbers. In addition, some R. petiolare occurred throughout both areas.

Preparatory work involved staking corners of plots, stringing boundaries, and opening a few roads. Dimensions of the 2-acre plots were 2 chains by 10 chains, and the 1-acre plots were 1 chain by 10 chains. Each plot was divided lengthwise by string line into strips 1/2 chain wide for spraying. Main hose was run on the 5-chain line through the middle of plots at right angles to their long axis. Spraying with 1/4-inch laterals was started along the main hose and carried outward toward the two ends of each plot. Upon finishing a strip, laterals were coiled and carried into the center of the adjoining strip. Quick-coupling Hansen fittings were employed throughout for hose connectors. Operating pressure at the tank was held between 200 and 250 pounds with as much of the pumping as possible done down hill from the tanker.

Three types of spray nozzles were used: the Hudson trombone pump head with a .0400 size disc mounted on a 1/8" by 36" pipe extension with a Bean #345 cutoff, the Bean #306 "Majestic" with a 3/64" size disc which was interchanged with the Hudson head on the 1/8" by 36" extension, and a Pecan gun which is an orchard type gun producing a mist or atomized spray in large volume. Three sizes of disc were used in the Pecan gun during the tests. These were a number 4, 5, and 6 with orifices of 4/64", 5/64", and 6/64". Gallons per minute at sea level under 300 pounds pump pressure are given as follows: Hudson, .45 gpm; Bean #306, .53 gpm; Pecan #4, 1.4 gpm; Pecan #5, 2.2 gpm; and Pecan #6, 3.0 gpm. Actual performance was somewhat below these figures because the tests were conducted at pump pressure of about 225 pounds and at an elevation of about 3,000 feet.

Two nozzlemen chosen for this study were inexperienced but knew ribes from having had about a month's work in hand methods of ribes eradication. The foreman supervised the work and operated the power sprayer. Training of the two nozzlemen was limited to about 2 hours of fundamentals in spraying with each of the three makes of nozzles. In the course of spraying they were shown the methods of handling and transporting the 150-foot lengths of 1/4-inch lateral hose. Training time was minimized because one of the objects was to determine in training inexperienced spraymen the relationship of nozzle production or man-days per acre to the accumulative hours of spraying with each nozzle. Tests were started July 21 and completed August 29. The seedling area in Breakfast Creek was worked first starting with plot 1 and continuing through plot 12. Type of nozzle was changed as spraymen completed a plot and moved into the adjoining one. The series of plots for a particular concentration of 2,4,5-T was completed before changing to a higher strength solution.

The field data summarized in Table 3 show for each of the nozzles the gallons of spray applied per acre and the pounds of 2,4,5-T acid per acre along with the man-days per acre for (1) the two spraymen, and (2) the entire crew composed of foreman and two spraymen. The man-days per acre under the column, "Spraying" include all the essential work in spraying and the handling of lateral hose in plot treatment. Under the heading, "Hose" is included spraying time plus that required to fill the tanker and the moving of any hose which would benefit more than one plot. Under "Miscellaneous" is included travel time and any period during which the power tanker was shut down for repair. "Time" under the two headings of "Hose" and "Miscellaneous" was separately totaled and proportioned equally among all plots of the seedling or mature bush series.

Table 4 is a summary of plot data grouped under the various nozzles. Until ribes population is shown by a check next season, the full significance of these data will not be apparent. Although ground and working conditions were fairly uniform throughout the plots, there was enough difference in ribes populations to vary gallons of spray, pounds of 2,4,5-T acid, and spraying time per acre. An interesting comparison in this table is in the variation of man-days per acre between nozzles for actual spraying time. The Pecan gun was far superior to the other two nozzles in the complete broadcast coverage of cutover lands mainly because of the ease in drenching the root crown of ribes. Whether or not there can be any significance attached to differences in spraying time of the #4, #5, or #6 size disc in the Pecan gun cannot be judged until ribes populations are determined and correlated with spraying time of each plot. The Pecan gun with a #4 disc seems desirable for broadcast spraying areas of seedling ribes, and the #5 disc for areas of mature ribes. Gallons of spray per acre are large in these tests by reason of attempting to obtain uniformity of treatment of plots through total coverage of ground with spray. These amounts per acre would be considerably reduced in most operations' work where spray is broadcast selectively to ribes bushes, ribes clumps, or ribes sites.

Table 5 was prepared to show progress in spraying as experience was gained in the use of each nozzle. This was undertaken to observe the course of production during the early stages in training and to determine about how much spraying was necessary with a nozzle before experience caused a reduction in man-days per acre. Figures given for estimates of man-days per acre in spraying were established by correlating actual man-days per acre for each plot with the accumulation of man-

days of experience with each nozzle. Both the Hudson and Bean nozzle show an increase in man-days per acre during the first few days in training. This was probably caused by demanding strict adherence to the technique of drenching root crowns. With these two nozzles it was often necessary to search for the crown. It required 6.75 man-days of spraying with the Hudson nozzle before man-day per acre costs were noticeably reduced. The Bean nozzle took 5.60 man-days, which are 1.15 man-days less than were required with the Hudson before experience began to lower man-day per acre costs. In contrast, spraying with the Pecan gun showed a steady decrease in man-days per acre from the first day to completion of spraying the last plot. The ease with which foliage can be sprayed and the root crown drenched with this gun explains its better record of operation over the Hudson or Bean nozzles.

A preliminary examination was made of all plots in the seedling and mature bush spray tests in September 1950. Although the extent of bush kill cannot be determined the same season of treatment, it was evident from the systemic damage of ribes that many revisions in field recommendations are likely to be in order when results of these tests are known in 1951. Observations will be made early enough to revise recommendations in time for the regular spray work of the 1951 field season. As it appeared this fall, results with the Pecan gun will be as good or better than results with the Hudson or Bean nozzles, and with its record of better performance, the Pecan gun is recommended for all power broadcast spraying. It should be fitted with a #4 disc for seedling ribes and a #5 disc for mature ribes.

Another study established in the Clearwater Forest this field season was a series of basal stem treatments using stove oil as a diluent for 2,4,5-T. Five plots were sprayed with concentrations of 2,4,5-T of 1%, 2½%, 5%, 10%, to 20%. The lower foot of stems and the root crown were the only portions of the bushes treated. Spray was applied with a knapsack and trombone pump. Ribes were large, mature bushes of both species. They varied in age from 7 to 9 years. Basal stem treatment of isolated patches of mature ribes is a quick method of spraying, requires little chemical solution, and can be employed late in the fall season after bushes are defoliated, early in the spring before bushes are fully foliated, or during the regular season of spraying with aqueous solution. These plots will be checked early in 1951 so that recommendations for basal stem treatments can be included with those for aqueous sprays.

TABLE 3

SUMMARY OF PLOT DATA FROM LARGE-SCALE TESTS WITH CONVENTIONAL POWER SPRAYER EQUIPMENT, CLEARWATER FOREST, 1950

Plot No.	Date Sprayed	Type of Nozzle 1/	p.p.m. 2,4,5-T	Per Acre		Man-Days Per Acre				
				Gals. Spray	Lbs. 2,4,5-T	2 Spraymen		3-Man Spray Crew		
						Spraying	Hose	Spraying	Hose	Misc.
Immature Bushes										
1	7/21,22	Bean	500	270	1.17	1.05	1.24	1.58	1.86	2.10
2	7/24,25	Hudson	500	155	.67	1.25	1.44	1.87	2.15	2.39
3	7/26,27	Pecan #6	500	317	1.37	.91	1.10	1.36	1.66	1.90
4	7/27,28,29	Hudson	1,000	170	1.47	1.44	1.63	2.16	2.44	2.68
5	7/31,8/1	Bean	1,000	285	2.46	.94	1.13	1.41	1.69	1.93
6	8/1,2	Pecan #6	1,000	387	3.34	.99	1.18	1.48	1.76	2.00
7	8/2,3,4	Hudson	1,500	222	2.88	1.05	1.24	1.58	1.86	2.10
8	8/4,8	Bean	1,500	362	4.69	1.19	1.38	1.78	2.06	2.30
9	8/8,9	Pecan #6	1,500	252	3.27	.70	.89	1.05	1.33	1.57
10	8/9,10	Pecan #6	2,000	302	5.22	.61	.80	.92	1.20	1.44
11	8/10,11,12	Bean	2,000	295	5.10	1.21	1.40	1.81	2.09	2.33
12	8/12,14,15	Hudson	2,000	290	5.01	1.49	1.68	2.23	2.51	2.75
Mature Bushes										
1	8/15,16	Hudson	1,000	275	2.38	1.52	1.72	2.28	2.58	2.91
2	8/17	Bean	1,000	280	2.42	1.21	1.41	1.81	2.11	2.44
3	8/17,18	Pecan #5	1,000	320	2.77	.73	.93	1.09	1.39	1.72
4	8/18	Pecan #6	1,000	405	3.50	.73	.93	1.09	1.39	1.72
5	8/18,19	Hudson	2,000	265	4.58	1.42	1.62	2.12	2.42	2.75
6	8/19,21	Bean	2,000	390	6.74	1.33	1.53	2.00	2.30	2.63
7	8/22	Pecan #5	2,000	420	7.26	.77	.97	1.16	1.46	1.79
8	8/22,24	Pecan #6	2,000	360	6.22	.67	.87	1.00	1.30	1.63
9	8/24,25	Hudson	3,000	300	7.78	1.60	1.80	2.40	2.70	3.03
10	8/25,26	Bean	3,000	320	8.30	1.15	1.35	1.72	1.92	2.25
11	8/26	Pecan #5	3,000	285	7.39	.58	.78	.87	1.17	1.50
12	8/26	Pecan #4	3,000	295	7.65	.69	.89	1.03	1.33	1.66
13	8/28	Hudson	4,000	215	7.43	.85	1.05	1.28	1.58	1.91
14	8/28,29	Bean	4,000	205	7.09	.77	.97	1.16	1.46	1.79
15	8/29,30	Pecan #5	4,000	205	7.09	.48	.68	.72	1.02	1.35
16	8/29	Pecan #4	4,000	210	7.26	.50	.70	.75	1.05	1.38

1/ Number refers to size of disc in Pecan gun, diameter of disc orifice given in text.

TABLE 4

SUMMARY OF PLOT DATA FOR EACH NOZZLE
CLEARWATER POWER SPRAYER TESTS, 1950

Type of Nozzle	Per Acre		Man-Days Per Acre				
			2 Spraymen		3-Man Spray Crew		
	Gals. Spray	Lbs. 2,4,5-T	Spraying + Hose		Spraying + Hose + Other		
Immature Bushes							
Hudson	209	2.51	1.31	1.50	1.96	2.24	2.48
Bean	303	3.35	1.10	1.29	1.64	1.92	2.16
Pecan #6	315	3.30	.80	.99	1.20	1.48	1.72
Mature Bushes							
Hudson	264	5.54	1.35	1.55	2.02	2.32	2.65
Bean	299	6.14	1.11	1.31	1.67	1.97	2.30
Pecan #4	252	7.45	.57	.77	.89	1.19	1.52
Pecan #5	307	6.13	.64	.84	.96	1.26	1.59
Pecan #6	382	4.86	.70	.90	1.05	1.35	1.68
Averages							
Hudson	237	4.02	1.33	1.52	1.99	2.29	2.58
Bean	301	4.75	1.11	1.30	1.66	1.96	2.25
Pecan #4	252	7.45	.57	.76	.89	1.19	1.48
Pecan #5	307	6.13	.64	.83	.96	1.26	1.55
Pecan #6	337	3.82	.77	.96	1.15	1.45	1.74
Pecans	313	5.19	.70	.89	1.04	1.34	1.63

TABLE 5

ESTIMATES OF MAN-DAYS PER ACRE FROM CURVE BASED ON ACTUAL AND ACCUMULATIVE MAN-DAYS PER ACRE FOR EACH NOZZLE

Plot No.	Date Sprayed	Ribes Series	Nozzle	Gals Spray Per Acre	Man-Days Per Acre 2 Spraymen		
					Actual	Accumulative	Estimated
2	7/24,25	Seedling	Hudson	155	1.25	1.25	1.29
4	7/27,28,29	"	"	170	1.44	2.69	1.30
7	8/2,3,4	"	"	222	1.05	3.74	1.33
12	8/12,13,14	"	"	290	1.49	5.23	1.38
1	8/15,16	Mature	"	275	1.52	6.75	1.42
5	8/18,19	"	"	265	1.42	8.17	1.39
9	8/24,25	"	"	300	1.60	9.77	1.30
13	8/28	"	"	215	.85	10.62	1.21
1	7/21,22	Seedling	Bean	270	1.05	1.05	1.04
5	7/31,8/1	"	"	285	.94	1.99	1.07
8	8/4,8	"	"	362	1.19	3.18	1.12
11	8/10,11,12	"	"	295	1.21	4.39	1.18
2	8/17	Mature	"	280	1.21	5.60	1.20
6	8/19,21	"	"	390	1.33	6.93	1.16
10	8/25,26	"	"	320	1.15	8.08	1.06
14	8/28,29	"	"	205	.77	8.85	.97
3	7/26,27	Seedling	Pecan #6	317	.91	.91	.90
6	8/1,2	"	"	387	.99	1.90	.85
9	8/8,9	"	"	252	.70	2.60	.78
10	8/9,10	"	"	302	.61	3.21	.73
3	8/17,18	Mature	" #5	320	.73	3.94	.71
4	8/18	"	" #6	405	.73	4.67	.71
7	8/22	"	" #5	420	.77	5.44	.70
8	8/22,24	"	" #6	360	.67	6.11	.68
11	8/26	"	" #5	285	.58	6.69	.64
12	8/26	"	" #4	295	.69	7.38	.60
16	8/29	"	" #4	210	.50	7.88	.55
15	8/29,30	"	" #5	205	.48	8.36	.53

DISEASE STUDIES RELATED TO CONTROL STATUS

Work on Rust Damage and White Pine Stocking Appraisal, 1946-1950

In the summer of 1946 the D. & I. Project began work on the revamping and standardizing of blister rust damage and white pine stocking appraisal methods then in use among the blister rust operational units of the Northwestern Region. This work was needed because existing rust surveys gave rust damage statistics in terms of percent of trees infected or damaged, often regardless of whether or not the infected or damaged tree was an "effective stocking" tree and might reasonable by expected to remain in the stand and yield merchantable timber at maturity. Available data gave stocking in terms of number of trees or stocked quadrats per acre, also regardless of whether they were effective stocking trees. Often they included no deductions for rust damage losses. After the discontinuation of the Pine Disease Survey in 1941, each blister rust operation developed its own methods of rust damage appraisal. While many of these methods were excellent approaches to the problem, each differed from the other. Lack of standardization of methods made a critical, regionwide appraisal of the effect of rust damage in reducing white pine stocking difficult if not impossible. In addition, information on rust damage in stands over 30 to 40 years old was almost lacking.

New concepts in white pine timber management, notably that of white pine working unit analysis, called for more accurate and standardized data both on effective stocking and on blister rust losses to the effective stocking. Blister rust control personnel and timber management men were finding the lack of these data a serious deterrent to the development of sound plans by the unit area analysis method. Accordingly, developmental work on methods of white pine stocking and rust damage appraisal was accelerated, culminating in 1948 with the establishment of a large-scale, standardized, regionwide stocking and rust damage survey. Investigative, training, and administrative work contributed by the D. & I. Project to the establishment and operation of the survey, plus some information on survey coverage, survey results, and on uses made of survey data are summarized below.

A separate study on the infective potential of small Ribes lacustre bushes is included at the end of this section.

1. Recognition of potentially damaging branch cankers: The question of distinguishing between harmless branch cankers which die before reaching trunk, and potentially damaging branch cankers which probably will reach trunk and cause tree death, has received previous attention from blister rust control personnel. It has been reported and is quite commonly known that the large majority of branch cankers die before reaching trunk. The cause of death is usually attributed to failure of the supply of elaborated foods upon which the obligate rust parasite depends for continued life. Presumably these foods are translocated downward, from the needles toward the trunk. Food supply failure may arise from a number of causes, but usually is due to death of the entire canker supporting branch or to death of the infected portion thereof. In relation to death of the entire canker supporting branch, it was found that death of the branch induced by stand closure and suppression usually occurred prior to the time the canker had spread more than 24 inches toward trunk. Hence,

average cankers occurring more than 24 inches from trunk could be classified as harmless. In the case of death of the infected portion (internode) of a cankered branch, it was reasoned that once the rust fungus had caused death (flagging) of the outward portions of the supporting branch and with the resulting cessation of the supply of elaborated foods coming therefrom, then its continued life would depend upon the rapidity with which its mycelia could reach a new source of food. Thus the rust mycelia would have to reach live lateral branches in the direction of trunk rapidly enough to precede the death of the starving, unsupported branch internode upon which they were living. It was further reasoned that death of canker bearing unsupported internodes (portions of the infected branch intervening between adjacent nodes having live lateral branches) of equal diameter would occur at about the same time following flagging, and that length of the unsupported internodes intervening between canker and trunk would become an important factor determining duration of canker spread toward trunk. If this were found to be so, then length of unsupported internodes could be employed as a means of judging whether or not a threatening canker, originating within 24 inches of trunk, was in effect a potentially damaging canker which in all likelihood would continue its spread into trunk.

Following the above line of reasoning, and using 8 to 10 years' canker development data on some 1,350 branch cankers as recorded in the University of Idaho, Northwestern Region Office of Blister Rust Control, and Forest Service cooperative canker study, a workable method was developed for appraising threatening blister rust cankers. The cooperative study data are distinctive both in length of time the individual cankers have been followed and in the variety of observations and measurements recorded annually in relation to development of canker and cankered branch. Among the data were thrice-yearly observations on position of canker margin, branch diameter at canker margin, and occurrence of flagging. Also contained were yearly observations on whether or not lateral branches were alive, presumably contributing to canker food supply as the canker grew past them toward trunk. These are the only records known for determining the longest unsupported internode across which an average canker will spread on a branch of a given diameter class. It was found that average cankers on 0- to 1/4-inch branches spread across about 2 3/4-inch unsupported internodes prior to death of the starving internode and the canker, on 1/4- to 1/2-inch branches 4 1/4-inch internodes, on 1/2- to 3/4-inch branches 5 1/2-inch internodes, on 3/4- to 1-inch branches 6 1/2-inch internodes, and on branches over 1 inch, 6 3/4-inch internodes. Mean values for average longest unsupported internode crossed according to 1/4-inch branch diameter classes were found significantly different up to the 3/4- to 1-inch branch diameter class. Significance was lacking above this diameter class principally due to lack of measurements in the larger branch diameter classes.

For field use, and to be on the conservative side when estimating stocking after deduction of rust losses, the unsupported internodal lengths were rounded off as follows: 0- to 3/4-inch branch diameter class, 6-inch internodes; 3/4- to 1-inch class, 9-inch internodes; and 1-inch plus class, 12-inch internodes. A. W. Slipp of the University of Idaho had already prepared data on canker annual growth rate by branch diameter class, and on time required after inoculation for the appearance of the various canker stages and occurrence of flagging. Thus it was possible to predict the approximate position of a canker margin at the time of flagging, then to measure length of various unsupported internodes intervening between threatening canker and trunk to predict the ability of the

canker to reach trunk. This method of canker appraisal is now in general use throughout the region. Details on the development of the method are contained in Bingham's part of the D. & I. Project section of the 1947 annual report, in the Northwestern Region Stocking Rust Damage Survey Manual, Bingham, 1949, and in a mimeographed training aid, Reference Tables for Training of Stocking Damage Survey Personnel, Bingham, 1949.

2. Blister rust damage in pole-size western white pine stands: The relative scarcity of 40- to 80-year-old (pole size) western white pine stands, and the uneven age class distribution resulting from the scarcity have made existing pole stands extremely valuable from the timber management standpoint. Timber managers have requested that existing well stocked pole stands receive priority in treatment for blister rust control. To determine which pole stands required immediate protection, it was necessary to segregate well from poorly stocked stands. This necessitated gathering information on the amount of rust damage in certain pole stands suspected of having suffered severely from blister rust. At the suggestion of Herman E. Swanson, Regional Leader, a study was initiated to determine the extent of losses in white pine pole stands.

A heavily infected 55-year-old white pine pole stand on the Middle Fork of the St. Maries River, St. Joe National Forest, was selected for determining the extent of rust damage in an infected pole stand. Dominant and codominant white pines on 54 1/10-acre plots systematically distributed over the 532-acre pole stand were climbed and examined. It was found that rust damage in such obviously infected stands could be severe; in this case about 70 percent of the dominant white pines had trunk cankers or potentially damaging branch cankers. Trunk cankers could usually be detected from the ground, particularly when binoculars were used, but small branch infections escaped detection from the ground. In this respect, it was found that individual pole-size trees could be climbed and appraised for rust damage with relative safety and rapidity, but in a large stand the cost of climbing might prove prohibitive. Sampling intensity studies would be required before undertaking any large-scale rust damage survey where tree climbing was involved. To secure data of practical significance, rust damage surveys should be restricted to trees most likely to yield merchantable timber at stand maturity. Damage and stocking surveys should be run concurrently since the best measure of damage is not the number of trees lost but the effect of this loss on the stocking of the stand. Additional work on the findings was planned. Details of the pole damage study are given in Northwestern Region Office of Blister Rust Control Serial Report No. 139, Bingham, 1947.

3. Appraisal of effective (crop tree) white pine stocking: As already mentioned, existing disease surveys, damage surveys, pine counts, and stocked quadrat surveys could not be used with certainty to predict the effect of blister rust damage in reducing white pine stocking. To supply reliable rust damage and stocking information, it was necessary to develop a method of distinguishing among young trees of several species those most likely to produce salable sawtimber at stand maturity (crop trees). It was generally recognized that crop tree stocked units of growing space (crop tree stocked quadrats) per acre, not number of trees or crop trees per acre, would give the most reliable indication of stocking intensity. Also, silviculturists of the region were generally in agreement that quadrat size should increase directly with the age of the stand. Nevertheless, the lack of basic information on growing space requirements of

white pine in the various age classes prevented the establishment of generally acceptable quadrat sizes. It was known that relatively isolated white pines most often have the best chance of becoming crop trees. Thus, stands with relatively few but well spaced white pines per acre often approached full stocking far more rapidly than did those with many more but less evenly distributed white pines per acre. This indicated that quadrat size in young stands might well be larger than heretofore in use.

In order to obtain the necessary information, C. A. Wellner white pine silviculturist of the Northern Rocky Mountain Forest and Range Experiment Station, and Bingham examined records from long standing normal yield, growth and mortality, and reproduction stocking Experiment Station plots in an attempt to throw light on the crop tree and quadrat size problems. A curve for full crop tree stocking per acre was developed using as basic data the numbers of dominant and codominant white pines per acre present on the 30- to 120-year-old white pine normal yield plots. This curve was extended into the younger age classes through data on the survival and closure of young, evenly spaced stands (principally plantations), and modified in the older age classes according to the numbers of merchantable, intermediate class trees usually found in fully stocked mature stands. The curve was then employed to determine the number (hence size) of units of growing space (stocking quadrats), each of which should be stocked with a dominating white pine in order to assure full white pine crop tree stocking at stand maturity. Approximately 500 such evenly spaced crop trees were necessary in the 0- to 10-year age class in order to secure full stocking at 120-year stand maturity, 400 in the 11- to 20-year age class, 350 in the 21- to 30-year age class, 300 in the 31- to 40-year age class, 280 in the 41- to 50-year age class, 260 in the 51- to 60-year age class, 240 in the 61- to 70-year age class, 220 in the 71- to 80-year age class, etc., to 150 in the 110- to 120-year (mature) age class. Corresponding quadrat sizes for reproduction and pole stands ranged from 2 milacres (9 1/3 x 9 1/3 feet) in the 0- to 10-year age class, through about 5 1/2 milacres (14.1 x 14.1 feet) in the 71- to 80-year age class.

Stocking criteria thus established were employed in 1947 in a study aimed at showing the magnitude of the difference in rust damage estimates based upon numbers of crop tree stocked quadrats depopulated of all potential white pine crop trees by rust vs. those based upon numbers of white pine trees or crop trees lost due to rust. A series of twenty-four 100-quadrat plots was established throughout the region, using a quadrat size varying directly with age of stand being investigated. The following conclusions were gained from the study plots: (1) Due to the natural occurrence of western white pine reproduction in dense if scattered patches, and to the relatively large size of quadrats deemed necessary for crop tree stocking estimations in young stands, it was possible for several white pines, each with equal potentialities of becoming a crop tree, to occupy a given stocking quadrat at a given time. This meant that the loss of one of these potential crop trees did not preclude a loss in stocking. (2) There was a strong trend toward overestimating the amount of rust damage, when using loss of crop trees regardless of their position on the ground. Rust damage estimates based on crop trees lost were up to five times as great and averaged one and one-half times as great as those based on depopulation of crop tree stocked quadrats. When damage estimates were based on all trees, regardless of their sawtimber potentialities, they were even further out of line. (3) There was no reliable means of correlating number of trees per acre with number of stocked quadrats

per acre, hence none for correlating number of crop trees lost with number of crop tree stocked quadrats depopulated. Several Experiment Station and Forest Service studies made at earlier dates have pointed out similar difficulties of correlation. (4) Additional information on the development of white pine in relation to that of its principal competitors was needed for making stocked quadrat judgments. This need was later satisfied by Mr. Wellner, who examined the records of the younger normal yield plots, the growth and mortality plots, and reproduction stocking plots. From these observations he developed a tabular summary showing relative competitive ability of each Inland Empire coniferous tree species when in association with white pine. The table as it now stands in the survey manual has been modified to some extent by Wellner and Bingham, according to results of later D. & I. field work.

Early in 1948 the Forest Service, Region One, requested that this new type combined stocking damage survey be employed in the investigation of several hundred white pine working units, the analysis of which was then seriously hampered by lack of reliable information on rust damage and its effect on stocking. While the Forest Service agreed to use the crop tree stocked quadrat type of survey, they wished to simplify field procedures by using a single size of quadrat, preferably of about 1/500 acre (2 milacres) in size. Thus, in age classes older than 0 to 10 years, it would be necessary to adjust survey estimates, compensating for the difference in the area of the 2-milacre quadrat and the area of quadrats already established as best suited for surveying in the older age classes under investigation. In addition, problems in reducing rust survey costs by cutting down survey intensity, also of establishing and testing the reliability of sampling methods, needed investigation prior to launching a large-scale survey.

Studies were set up to investigate the above questions. A method of sampling white pine areas using lines of contiguous quadrats laid at 10-chain intervals across both major and minor drainages regardless of cardinal directions was tested for accuracy of rust damage and stocking percentages obtained. It was found that both rust damage and stocking mean values were accurate to within plus or minus 15 percent of the mean values themselves in two out of three cases. This degree of accuracy satisfied Forest Service objectives. It was also found that the number of white pine crop tree stocked quadrats examined for rust damage could be reduced to about 1/10 the total number of such quadrats found on a survey line without reducing the accuracy of rust damage mean values. In the matter of adjusting survey values in stands in the 11- to 20-year age class and older, wherein the 2-milacre quadrat was considered small for the age class, it was found that adjustments could easily be made without loss of accuracy in survey values. Field tests wherein half-mile rows of 2-milacre quadrats were examined in stands of various age classes along identical lines as rows of the larger quadrats led to the following conclusion: When stocking and rust damage results obtained with the 2-milacre quadrat were multiplied by a factor obtained by dividing the area in the 2-milacre quadrat into the area contained in the larger quadrat better suited for the age class being surveyed, then results using the 2-milacre quadrat corresponded quite closely to those obtained using the larger and more representative quadrat. In four trials of this nature, mean difference between results was 3.3 percent, standard error of the mean difference 0.8 percent.

Detailed reports on the developmental work in disease and stocking surveys are contained in the D. & I. Project section of the 1947 and 1948 annual reports; in the Northwestern Region Stocking Rust Damage Survey Manual, Bingham, 1949; and particularly in the mimeographed training aid Reference Tables for Training Stocking Damage Survey Personnel, Bingham, 1949.

4. Technical supervision and training of stocking rust damage survey crews: Survey method development work was completed in the spring of 1948. Immediately following this the Forest Service large-scale survey employing about 50 survey personnel was launched. In the following year, 1949, about 40 men continued the survey work. By the end of the third season, 1950, with 30 men continuing the work, the aims of the large-scale survey were virtually fulfilled. Technical supervision of survey crews in the field consumed the largest part of Bingham's time during the 1948 and 1949 field seasons. By 1950, a well trained nucleus of survey supervisory personnel was available to most operations.

Survey training schools were held during 1948 and 1949; a total of about 60 men being trained in these 2 years. Other survey personnel was trained on the operations. Training schools covered the following points: (1) Methods of examining white pine reproduction and pole trees for blister rust including recognition of rust stages on pine, dating of blister rust cankers, distinguishing between harmless and potentially killing blister rust cankers, and tree climbing and tree climbing safety. (2) Survey equipment and methods including instruction in compass and pacing work, in the crop tree and stocked quadrat concepts, in silvicultural characteristics of white pine and other Inland Empire conifers as affecting competitive ability of potential white pine crop trees, and in determination of white pine site index. (3) Practical application of survey methods including test examinations and discussions of stocking within representative staked rows of stocking quadrats, running and recording data on actual survey lines, mapping survey data, and interpreting stocking and rust damage data gathered on the survey line. The Northwestern Region Stocking Rust Damage Survey Manual, Bingham, 1949, a revision of several 1948 instruction leaflets, was issued for instruction and use of survey personnel.

5. Survey coverage and results 1948-1950, some uses made of survey data: Altogether an estimated 3,000 miles of survey line covering some 200 white pine working units have been run in the last 3 years. On many of the units the survey was the first systematic investigation of stocking and rust damage among younger stands. In other units, the survey served to check and revise earlier stocking and damage estimates. Survey data were used as a starting point for practically all working unit analyses on units containing young stands. Since data taken on all forests were strictly comparable timber management and blister rust control, plans arising from the analyses could be coordinated on a regionwide basis and expenditures directed onto the most valuable young white pine stands requiring the earliest possible blister rust protection.

Accumulation of a large body of accurate and standardized survey data had other important uses. It was feasible to determine rate of rust damage development on areas classified according to control status as being protected (on maintenance), as partially protected (post check and rework classes), or as unprotected (unworked). A summarization of 1948 rust damage data according to status of control clearly showed the need for accelerating the rust control program. Findings were

as follows: (1) The better stocked white pine units supporting the most valuable young stands had been well selected in the application of early blister rust control work. Many of these fine young stands were on maintenance, usually only recently so, but early work had so delayed rust development that maintenance stands have suffered the lightest rust damage and retained 84 percent of their original effective stocking. (2) Moderately well stocked stands which received their first control work generally a few years later than the maintenance stands were mostly in the post check and rework categories. In these partially protected stands ribes populations had been reduced early enough so that rust damage was far below that on unprotected areas. Sixty-eight percent of the original effective stocking remained and acceleration of control work was strongly indicated to prevent serious loss of stocking in the next 20 to 25 years. (3) Poorly stocked and inaccessible areas remained unprotected and had only about 25 percent of the original effective stocking left. (4) Curves depicting the relative rates of rust development on areas that had been exposed for various lengths of time to rust showed that on both partially protected and unprotected areas the annual damage rate increased sharply after about 5 to 10 years' exposure to rust. Fortunately, the rate increased only up to about 2½ percent per year in partially protected stands, vs. 5 to 10 percent per year in unprotected stands. A knowledge of losses likely to occur during any deferred work period could be obtained from these curves and the areas which should be worked currently could be separated from those upon which work could be deferred for a given number of years without suffering reduction in stocking to the extent that future white pine yields would not justify the cost of control work. (5) The accumulated data prove that previous blister rust control in the region has protected considerable actual and potential white pine stumpage, and suggest that the size of the present blister rust control program in the region should be materially increased. Regional stocking inventories derived from survey data show that 0- to 80-year-old maintenance areas now support about 5 billion board feet of potential white pine sawtimber. At the conservative stumpage price of $13 per MBF, this represents a value of about 65 million dollars. Another 7 billion board feet of potential timber remains in partially protected young stands where it is being depleted at the rate of about 2½ percent per year. This represents a value of about 90 million dollars disappearing at the rate of about 2¼ million dollars per year. This loss could be decreased by increasing the size of the present control program.

6. Additional work needed: During the past few years in this region, blister rust losses in advanced pole and mature stands on certain unprotected areas have become increasingly apparent. In the case of pole stands, loss of merchantable trees has been generally observed for some time and a study aimed at determining when and how salvage cuttings should be made is of immediate concern. In mature stands serious damage has only just begun to appear in a few stands within the region. The problem of salvage cuttings in mature stands will soon become more pressing. Aside from timber management considerations, the solution to either of these salvage cutting problems hinges about determination of the rate of development of rust cankers in large diameter stems. A new permanent plot has been established wherein 100 trunk cankered white pine will be studied for the next several years to determine whether or not time of tree death can be predicted by symptoms observable from the ground. This may solve some of the problems of salvage cuttings in pole stands where trunk cankers and other gross symptoms can often be observed from the ground. In mature stands, however,

where size of crown, height of tree, and other factors make it difficult to detect trunk cankers from the ground, work on climbing and examining a small sample of the trees in the stand is indicated. Work is planned for the coming season on methods of climbing and examining a very small sample of the white pines in young mature stands.

Work on Infective Potential of Small Ribes lacustre Bushes

The Ames Creek small bush study: This study aimed at determining the infective potential of small Ribes lacustre bushes was initiated in 1946 and has been followed annually since. To date it has been shown that concentrations of small well screened R. lacustre bushes (up to about 30 bushes with 30 FLS per acre) are sufficient to cause considerable rust damage in reproduction stands. At first, rust damage seems negligible, the very small, young white pines lost being rapidly replaced by new white pines only recently seeded in. Later, as older established white pines are lost, the white pine growing space thus lost often is not reoccupied by white pines due to prior occupation of the space by an understory of more tolerant conifers (western hemlock, grand fir, western red cedar). If the small annual losses in white pine growing space continue to accumulate, they will probably make additional control work necessary. A detailed report on this study has been issued as Serial Report 140, Bingham, 1947. The report has been amended in 1947 and 1948 by the addition of results for these years. Results for 1949-1950 which somewhat alter previous conclusions will be issued soon.

DEVELOPMENT OF RUST RESISTANT WHITE PINE

Blister rust control personnel, and other foresters and forest pathologists, have long noted what they believed might be resistance to blister rust, being exhibited by individual western white pines occurring in heavily rust damaged stands. This belief was encouraged by results of the University of Wisconsin - Division of Plant Disease Control - Division of Forest Pathology cooperative study on blister rust resistance among eastern white pines. Work directed toward rust resistant tree breeding started in the Northwestern Region in 1947, with small trials in the vegetative propagation of western white pine. From 1947 to 1949, inclusive, interest in rust resistance breeding work increased, fostered by the discovery of 14 apparently resistant trees in old, heavy rust centers, and by the growing belief that high costs and difficulty of control of blister rust on certain problem areas might well be offset by planting with resistant stock. Accordingly, during the latter part of 1949, Herman E. Swanson, Regional Leader, initiated cooperative work for an accelerated and expanded study of rust resistant white pine.

1. The Proposed Breeding Program: A 5-point program for breeding rust resistant western white pines was proposed as follows: (1) Slect, describe, and permanently tag apparently rust resistant trees, preferably of fruiting age, on old blister rust centers throughout the Inland Empire. (2) Vegetatively propagate the most promising of these selections for purposes of protecting, increasing, and accumulating them as clones in several convenient work centers throughout the Inland Empire. (3) Select the work centers in areas subject to heavy blister rust infection so that they may become effective test plots wherein clones may be subjected to further testing for rust resistance. (4) Test the resistance of the clones under uniform, heavy conditions of natural inoculation with blister rust, at the same time testing the progeny of the clones by returning to original fruiting selections and making controlled pollinations among them to obtain first generation (F_1) progeny. (5) Depending on the outcome of these F_1 progeny resistance tests, i.e., whether stock from the controlled pollinations exhibits a useful degree of resistance, or lack of resistance, to convert the clonal plantings on the resistance test plots into orchards for the production of resistant seed, or to turn the clones and F_1 progeny over to other organizations better equipped to handle long-term tree breeding projects.

The California Forest and Range Experiment Station, Institute of Forest Genetics, is the principal contributor to a rust resistant white pine breeding project using the hybridization approach. Certain exotic white pines exhibiting inherent resistance to blister rust are being crossed with western and other white pines in an effort to combine the timber qualities of native white pines with the rust resistance of the exotics. It has been pointed out that possibilities of obtaining hybrid vigor, and possibly resistance to more than one strain of the rust fungus, if such exists, are important attributes of the hybrid approach to rust resistance. Institute personnel engaged in this hybridization work are, however, in agreement that work on the breeding of western white pines within the species should be pursued as vigorously as that between the species and inherently resistant exotics. It is recognized that climatic adaptation of an exotic tree, or hybrid thereof, may require considerable time, and that exotic trees might well prove highly susceptible to serious attack from pathogens endemic and unimportant on native white pines.

2. Breeding Program Cooperators and Work Assignments: Following conferences with leaders in the Division of Forest Pathology in rust resistance breeding work with eastern white pine and in hybridization work, and after general acceptance of the 5-point program outlined above, a tentative list of cooperators and their work assignments in breeding rust resistant western white pine was formulated. Invitations to cooperate were accepted by all concerned, working plans were accepted by the Agricultural Research Administration, and final work assignments made to the various cooperators as follows: (1) Bureau of Entomology and Plant Quarantine, Division of Plant Disease Control (Blister Rust Control), field work including resistant tree selection, description, vegetative propagation, and testing of resistant tree clones and progeny; making controlled pollinations under the technical direction and with the assistance of the California Forest and Range Experiment Station, Institute of Forest Genetics; collection and later handling of resistant tree seed; collection and distribution of resistant tree pollens, scionwood, and grafted trees to other cooperators. (2) U. S. Forest Service, Northern Rocky Mountain Forest and Range Experiment Station (R. K. LeBarron and A. E. Squillace), assistance in resistant tree description, assistance in resistance test plot location, direction of tree vigor and quality testing work, assistance in making controlled pollinations, direction of experimental design in laying out resistance test plots, assistance in outplanting clones and progeny. (3) U. S. Forest Service, California Forest and Range Experiment Station, Institute of Forest Genetics (F. I. Righter and J. W. Duffield), research in genetics of improved white pines and development of hybrids showing resistance to rust, training personnel in methods of tree breeding, directing technical supervision of initial (1950) controlled pollinations in north Idaho, accumulation and storage of resistant tree pollens, establishment of clonal plantations of resistant western white pines at Placerville, California. (4) U. S. Forest Service, Region 1, Division of Timber Management (G. M. DeJarnette and J. W. Augenstein), assistance in resistant tree location work, assistance in resistance test plot location (clearing, and land administrative problems), provision of nursery stock for purposes of grafting and for use as test plot controls, assistance in outplanting resistant tree clones and progeny. (5) Bureau of Plant Industry, Division of Forest Pathology, Portland, Oregon, office (J. L. Bedwell), possible assistance in later phases of progeny testing.

3. Training in Techniques of Tree Breeding Work: One of the first phases of the expanded tree breeding project was to build up technical knowledge in tree breeding methods among cooperators in this region. Bingham and Squillace were sent to Placerville, to the California Forest and Range Experiment Station's Institute of Forest Genetics, to obtain the necessary training. Schooling in methods of tree climbing, pollen collection, extraction and germination testing, bagging and pollination of pine flowers, extraction, storage and stratification of seed, and in propagation and vigor testing of experimental pine stock was provided in a 2 weeks' course given by members of the Institute staff. Plans were made for Mr. Duffield to come to north Idaho for the 1950 pollination season. This training paid dividends in time saved and successful pollinations made during the rush of the first season's work.

4. Vegetative Propagation of Western White Pine: Investigative work on vegetative propagation of western white pine continued through the winter of 1949-50. Practical vegetative propagation work using grafts to establish the desired clonal plantations will be undertaken this winter, using knowledge of grafting methods gained through the earlier work.

Trials showed that rust resistant western white pines could not now be propagated by cuttings; in fact, success in rooting cuttings occurred with only two 5-year-old cuttings among more than 8,000 tested in batches of 25 to 100, with various auxin concentrations, under varying conditions of temperature, bottom heat, humidity, propagating media, fungicidal treatment, and type of cutting. Cuttings from trees up to 60 years of age callused readily but consistently failed to root. It was concluded that until we become more proficient at rooting older cuttings there was little virtue in wasting valuable resistant tree material in attempting propagation from cuttings. Unfortunately, resistant trees cannot be very well selected until they have had at least 10 to 15 years' exposure to rust under natural conditions. Furthermore, it is advisable to concentrate initial selection work among stands already of cone-bearing age.

Results in grafting resistant western white pines were more encouraging. At the conclusion of investigative work on methods of grafting western white pines it was known that simple cleft, side, or veneer grafts (scion and stock both not over 1 year old, and made in a 70°F. sweatbox) gave 75 to 85 percent successful graft unions. On the basis of this work, it was decided to use grafted resistant trees as clonal stock for the resistance test plots.

5. Resistant Tree Location Work, 1950: Field work in the first season of the expanded tree breeding project began with the location of about 45 additional resistant trees. Added to the 14 resistant trees already located, this provided about 60 trees with which to work. The location work was done with a crew of four men experienced in blister rust damage survey work, their pay and subsistence being provided by the Forest Service. Actual search for trees was carried on under the direction of Bingham, working in several advanced rust centers on the St. Joe, Coeur d'Alene, and Kaniksu National Forests. Freedom from rust as evidenced by lack of cankers on all living and dead branches was the principal criterion for selection. Several of the trees exhibiting such freedom from rust, while their branches interlocked with adjacent white pines supporting from 500 to 1,000 cankers apiece, appeared to be very promising selections.

6. Controlled Pollination Work, 1950: Pollination work commenced almost immediately after the suspension of resistant tree location work in June 1950. Mr. J. W. Duffield of the Institute of Forest Genetics was on hand to give technical direction to the work, Mr. A. E. Squillace to assist. In all, about 600 pollination bags were used to cover every flowering shoot present on resistant trees during the 1950 season. Flowering shoots were bagged on about 20 resistant trees. Pollen was collected and extracted from about the same number of trees. In all, about 25 resistant trees were brought into the 1950 controlled pollination program. Among the 25 trees 82 separate crosses were attempted. Pollens of exotic white pines and of eastern white pine were employed in making about 10 additional crosses. Through September 1950, it appeared that about 80 of the western white pine crosses had been successful, but a final determination must wait until the seed harvest in the fall of 1951. Cones wind pollinated in 1949, in place on resistant trees during the 1950 pollination season, were bagged with cloth bags for protection against rodents and insects. Seeds from wind pollinated cones of 21 different resistant trees were collected and extracted in the fall of 1950. They will be of use in future resistance test plot trials. Yields in wind pollinated seed varied widely but are of interest

in revealing the productive capacity of young, well-spaced white pine trees. Several 30- to 35-year-old trees produced from 50 to 100 cones yielding over a quarter of a pound of seed (50-10,000 seeds) apiece. Phenological data covering time of flower and pollen production, of possible use in future pollination programs and in the positioning of trees in seed orchards, were also collected.

7. Selection and Clearing of Rust Resistance Test Plots: Five 5- to 7-acre blister rust resistance test plots have been selected, agreed upon by principal cooperators, and, except for one plot, cleared of timber and brush. Four of these upon National Forest land have been approved for long-term use by the forests concerned and Special Use Permits guaranteeing exclusion of other uses obtained. One of the plots (Crystal Creek) is on county land but acquisition by the Forest Service is now under way. The plots are located on good sites with deep soils; all are in moderately heavy to heavy blister rust centers outside the control areas. They are Crystal Creek and Elk Creek, St. Joe National Forest; Tacoma Creek, Kaniksu National Forest; Tepee Creek, Coeur d'Alene National Forest; and Randolph Creek, Cabinet National Forest. Clearing and fencing work on all of the plots except Crystal Creek should be completed by the spring of 1951, early enough for the outplanting of about 25 acres of grafted trees. The 25 acres to be planted should accommodate about 1,500 resistant tree grafts, when the grafts are planted at very wide intervals (30' x 30' spacing) to encourage early fruiting. Some 2,000 2-2 western white pine nursery stocks have been potted and are now in the greenhouse in preparation for grafting with resistant tree scions. Seventy-five percent success in grafting resistant tree scions onto these stocks will provide the clones necessary for outplantings next spring.

8. Work Planned for 1951 Through 1960: A brief summary of work needed to complete the major part of the contribution of the Division of Plant Disease Control to the resistant tree breeding work is given in chronological order below.

Winter 1951	Collect scionwood from about 30 of the most vigorous, best formed, resistant western white pines of fruiting age. Make about 65 grafts of each on 2-2 nursery stock on hand in the greenhouse.
Spring 1951	Outplant the above grafts, establishing clonal plantations on the five resistance test plots already established. Plant ribes on resistance test plots wherever necessary to build up intensity of natural rust inoculation. Continue controlled pollinations, making crosses among important resistant trees not already in the pollination program. Bag young cones of 1950 controlled pollinations to protect them against rodents and insects.
Fall 1951	Collect and extract seed from cones of 1950 controlled pollinations. Collect and extract seed from wind pollinated cones of resistant trees if not already on hand.
Winter 1951-52	Graft new resistant trees or make replacement grafts as necessary to fill out experimental graft outplantings of spring 1951. Stratify 1950 controlled pollination seed and wind pollinated seed on hand.

Spring	1952	Plant stratified seed from 1950 controlled pollinations and from wind pollinations at Savenac Nursery, Haugan, Montana, using wide (2-inch) spacing between seeds. Outplant new or fill-in grafts in resistance test plots. Cone-bag 1951 controlled pollination cones.
Summer	1952	Fertilize graft plantings on resistance test plots.
Fall	1952	Collect and extract seed from 1951 controlled pollination cones. Collect and extract open pollinated cones of resistant trees not before collected.
Winter	1952-53	Stratify 1951 controlled pollination and wind pollinated seed collected in the fall of 1952.
Spring	1953	Plant seed stratified in the winter of 1952-53. Fertilize 1-0 nursery seedlings (from 1950 pollinations).
Summer	1953	Fertilize new or fill-in grafts outplanted in the spring of 1952. Make first check for cankers on grafts outplanted in the spring of 1951.
Spring	1954	Outplant 2-0 seedlings of 1950 controlled and wind pollinations, with controls, on three subplots within three of the existing resistance test plots. Fertilize 1-0 seedlings (from 1951 pollinations).
Summer	1954	Make first check for cankers on grafts outplanted in the spring of 1952.
Spring	1955	Outplant 2-0 seedlings of 1951 controlled and wind pollinations, with controls, on same three subplots on resistance test plots. Fertilize 1950 controlled pollinated 2-1 transplants, already planted on these same subplots.
Spring	1956	Fertilize 1951 controlled pollinated 2-1 transplants.
Summer	1956	Make initial check for cankers on 2-2 1950 controlled and wind pollinated transplants and controls located on resistance test plots.
Summer	1957	Make initial check for cankers on 2-2, 1951 controlled and wind pollinated transplants and controls.
Summers	1958-60	Continue checking relative rust resistance of grafts, F_1 progeny of 1950 and 1951 controlled pollinations, wind pollinated seed of resistant trees, and controls. By 1960 the F_1 progeny and other trees on the resistance test plots will have had 6 to 7 years' exposure to blister rust. If certain of the F_1 progeny exhibit a useful degree of resistance, the 25 acres of graft plantings, then 9 to 10 years old, can immediately be converted into orchards for the production of resistant seed, possibly

by 1965 to 1975. Grafts from resistant trees representing the parents of resistant F_1 progeny will be left, possibly moved closer together, in certain of the graft plantations; those representing the parents of nonresistant F_1 progeny rogued out of the graft plantings. Should none of the F_1 progeny demonstrate a useful degree of rust resistance, then they should be transplanted at wide spacing from the subplots, fertilized, and otherwise encouraged toward early seed or flower production which will provide the means for testing the F_2 generation. The F_1 progeny should probably be transplanted and treated in this manner regardless of their resistance since they will then early provide a means of back-crossing semiresistant progeny in the F_2 generation, and because other cooperators (notably the Institute of Forest Genetics) may wish to continue breeding work aimed at establishing tree-breeding resistant strains. Tree vigor and quality testing by the Northern Rocky Mountain Forest and Range Experiment Station will probably already be under way in this period.

PHOTOGRAPHIC AND EDUCATIONAL WORK, 1950

By
Frank O. Walters, Assistant Regional Leader
H. Miller Cowling, Photographic Specialist

Photographic

The photographic section continued to serve all departments of this office. Records, tables, maps, charts, drawings, and pictures were reproduced in various ways to meet the needs of each department. The tables, maps, and pictures in this report are samples of some of the methods of reproduction used by the photographic section. As in past years, considerable work was done for the Pacific Coast Region. Service was rendered in a lesser degree to the Northeastern and Southern Appalachian Regions and Barberry offices in Pullman, Washington, and Minneapolis, Minnesota.

The regional blister rust moving picture "A Destructive Invader" was shown 43 times to a total of 1,842 people. A one-half ton pickup truck carrying a portable generator made it possible to show pictures in isolated camps. The "Show Boat" appeared before 990 woodworkers in 19 blister rust control camps.

Educational

Colored 2x2 slides have proven very effective when used in connection with talks on blister rust control. They adequately demonstrate various phases of the disease and control work. As a result of one showing, four additional requests for the illustrated lecture were made.

Eleven talks have been given before school groups, scientific, forestry, organizations, and service clubs.

An attractive and interesting exhibit was set up for the Spokane Sportsmen's Fair last spring. Living potted currant bushes and pine trees were used to realistically demonstrate disease-host relationships. The Baloptican with colored plates gave a detailed story of the disease and its control. The Fair attracted 61,000 people, most of whom visited the blister rust exhibit.

Three thousand seven hundred pieces of literature were passed out to the public or mailed to individuals upon request.

The Idaho State Land Board, making their annual field trip, visited the Priest Lake Timber Protective Association. The extensive cutover lands were inspected and blister rust problems were reviewed. Messrs. Swanson and Brischle accompanied the Board.

PHOTOGRAPHIC, BLACKLINE, MULTILITH, AND MIMEOGRAPH WORK

Item	Northwestern Region and Other Agencies	Pacific Coast Region	Total
PHOTOGRAPHIC			
Lantern slides, natural color, 3x4¼	54		54
Lantern slides, natural color, 2x2	271		271
Films developed, field films	115	34	149
roll films		5	5
Copies, 5x7	32		32
8x10	113	45	158
Printing, 4x5 or smaller	14	27	41
5x7	864	253	1,117
8x10	25	45	70
9x11	934	157	1,091
Enlarging, 5x7	20	254	274
8x10		16	16
11x14		8	8
16x20	9	81	90
20x24	31		31
Total Items	2,482	925	3,407
BLACKLINE			
Total Maps Printed	1,640		1,640
MULTILITH			
Duplimats	95		95
Plates	86	21	107
Cards	3,800		3,800
Sheets	68,700	6,700	75,400
Total Multilith Items	72,681	6,721	79,402
MIMEOGRAPH			
Stencils	87	19	106
Sheets	14,600	800	15,400
TOTAL All Items	91,490	8,465	99,955

ORGANIZATION OF THE NORTHWESTERN REGIONAL OFFICE - 1950

1. Regional Leader in Charge, H. E. Swanson, Control Supervisor

2. Assistant Regional Leader, F. O. Walters, Control Supervisor

3. Cooperative Local Control:

   a. Clearwater Operation, Idaho:
      Operation Supervisor, M. C. Riley, Forester
      Assistant Operation Supervisor, H. J. Faulkner, Forester
      Camp Superintendent, William Holland, Agent (Fur. eff. 10/31/50)
   b. St. Joe Operation, Idaho:
      Operation Supervisor, H. J. Hartman, Forester
      Assistant Operation Supervisor, W. F. Painter, Pathologist
      Unit Supervisor, Donald F. Williams, Agent
      Special Duty Assistant, R. E. Myers, Agent
      Camp Superintendent, A. E. Turner, Agent (Fur.eff. 11/1/50)
   c. Coeur d'Alene Operation, Idaho:
      Operation Supervisor, F. J. Heinrich, Pathologist
   d. Kaniksu Operation, Idaho-Washington:
      Operation Supervisor, H. A. Brischle, Pathologist
      Foreman, R. K. Lindgren, Agent (App. eff. 6/12/50)
      Unit Supervisor, L. J. Easley, Agent (Fur. eff. 11/21/50)
   e. Montana Operation:
      Operation Supervisor, A. S. Skoglund, Pathologist
   f. National Parks, Washington-Montana-Wyoming:
      Operation Supervisor, J. C. Gynn, Pathologist
      Assistant Operation Supervisor, C. M. Chapman, Pathologist

4. Projects:

   a. Education and Information:
      H. M. Cowling, Photographic Specialist
      J. C. Gonyou, Draftsman
   b. Disease Survey and Scouting
      R. T. Bingham, Pathologist
      Methods Development and Control Investigation (BLR 1-6):
      V. D. Moss, Forest Ecologist
      J. F. Breakey, Pathologist
      (Personnel assigned to Northwestern Region by H. R. Offord)

5. Business Administration and Clerical:

   a. S. J. Dorick, Administrative Assistant
      E. K. LaPrey, Storekeeper
      L. C. Miller, Automobile Mechanic
   b. M. L. McWold, Administrative Assistant, Fiscal
      M. C. Yourt, Clerk
   c. M. P. Kirsten, Clerk
      A. B. Treffry, Secretary (Steno.)
      J. L. Radkey, Clerk-Typist
   d. L. E. Klatt, Administrative Assistant, Personnel
      E. E. Smith, Clerk-Stenographer (Resigned eff. 10/11/50)

APPROPRIATIONS
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
NORTHWESTERN REGION OF BLISTER RUST CONTROL

Regular Appropriations

Fiscal Year 1950:			
Project W-a.14 NW (Administrative)		$142,100.00	
Project W-e.14 NW (Cooperative)		107,350.00	
			$249,450.00
Fiscal Year 1951 (as of 12/31/50):			
Project W-a.14 NW (Administrative)		$138,000.00	
Project W-e.14 NW (Cooperative)		100,000.00	
			$238,000.00

Contributed Funds (Deposited with U. S. Treasury)

State of Idaho		$ 25,000.00	
Clearwater Timber Protective Association	$6,608.72		
Potlatch Timber Protective Association	5,445.94		
Priest Lake Timber Protective Association	4,192.00	16,246.66	
			$ 41,246.66

TABLE 1

FEDERAL EXPENDITURES, NORTHWESTERN REGION OF BLISTER RUST CONTROL
CALENDAR YEAR 1950, REGULAR APPROPRIATIONS

	Project	Salaries	Expense	Total
	January 1 to June 30, 1950			
I	Planning, Coordination, Technical Direction			
	1.1 - Clearwater Operation, Idaho	$ 7,885.46	$ 1,856.64	$ 9,742.10
	1.2 - St. Joe Operation, Idaho	12,014.91	4,055.73	16,070.64
	1.3 - Coeur d'Alene Operation, Idaho	3,192.46	270.09	3,462.55
	1.4 - Kaniksu Operation, Idaho	4,756.09	1,325.96	6,082.05
	1.6C - Cabinet Operation, Montana	1,596.23	201.63	1,797.86
	1.6K - Kootenai Operation, Montana	1,596.23	201.63	1,797.86
	1.7 - National Parks	5,390.05	734.77	6,124.82
	1.A - Office Maintenance	16,574.26	5,029.02	21,603.28
	1.B - Supervision	7,046.20	667.06	7,713.26
	1.C - Education	2,440.39	323.64	2,764.03
	1.D - Control Investigations	2,378.34	354.36	2,732.70
	1.E - Methods Development	180.00	70.59	250.59
	Total, Project I, Jan. 1-June 30, 1950	$ 65,050.62	$15,091.12	$ 80,141.74
III	Cooperative Ribes Eradication on State and Private Lands			
	3.1 - Clearwater Operation, Idaho	$ 10,352.40	$ 3,595.54	$ 13,947.94
	3.2 - St. Joe Operation, Idaho	6,965.45	4,099.13	11,064.58
	3.3 - Kaniksu Operation, Idaho	4,731.79	3,542.44	8,274.23
	Total, Project III, Jan. 1-June 30, 1950	$ 22,049.64	$11,237.11	$ 33,286.75
	July 1 to December 31, 1950			
I	1.1 - Clearwater Operation, Idaho	$ 4,564.91	$ 441.15	$ 5,006.06
	1.2 - St. Joe Operation, Idaho	9,639.55	898.45	10,538.00
	1.3 - Coeur d'Alene Operation, Idaho	2,890.64	175.36	3,066.00
	1.4 - Kaniksu Operation, Idaho	6,240.19	572.75	6,812.94
	1.6C - Cabinet Operation, Montana	1,445.32	130.56	1,575.88
	1.6K - Kootenai Operation, Montana	1,445.32	130.57	1,575.89
	1.7 - National Parks	4,793.94	1,265.95	6,059.89
	1.A - Office Maintenance	13,926.99	4,873.17	18,800.16
	1.B - Supervision	6,661.54	550.15	7,211.69
	1.C - Education	2,259.63	241.41	2,501.04
	1.D - Control Investigations	266.83	185.46	452.29
	1.E - Methods Development	2,217.00	185.91	2,402.91
	Total, Project I, July 1-Dec. 31, 1950	$ 56,351.86	$ 9,650.89	$ 66,002.75
III	3.1 - Clearwater Operation, Idaho	$ 19,506.91	$ 8,936.07	$ 28,442.98
	3.2 - St. Joe Operation, Idaho	24,010.23	6,724.47	30,734.70
	3.4 - Kaniksu Operation, Idaho	10,018.95	2,209.44	12,228.39
	Total, Project III, July 1-Dec. 31, 1950	$ 53,536.09	$17,869.98	$ 71,406.07
	Grand Total, Calendar Year 1950	$196,988.21	$53,849.10	$250,837.31

TABLE 2

SUMMARY OF EXPENDITURES FROM STATE AND PRIVATE FUNDS, 1928 - 1950, IDAHO

Year	State	T.P.A.	Total
1928	$ 2,518.55	$ 2,264.32	$ 4,782.87
1929		19,027.66	19,027.66
1930		20,000.00	20,000.00
1931	5,000.00	35,905.32	40,905.32
1932	8,003.43	11,186.33	19,189.76
1933			
1934	29,154.06		29,154.06
1935	15,000.00		15,000.00
1936	16,998.25		16,998.25
1937	15,001.25		15,001.25
1938	15,000.44		15,000.44
1939	15,438.04		15,438.04
1940	10,034.48		10,034.48
1941	7,542.73	15,756.40	23,299.13
1942	22,761.68	15,440.78	38,202.46
1943	12,252.13	386.68	12,638.81
1944	12,506.60	15,612.98	28,119.58
1945	6,287.68	5,111.03	11,398.71
1946	14,943.35	26,651.65	41,595.00
1947	15,028.11	15,909.24	30,937.35
1948	20,025.00	15,953.94	35,978.94
1949	20,003.03	16,016.58	36,019.61
1950	24,141.65	16,246.66	40,388.31
Total	$287,640.46	$231,469.57	$519,110.03

ATTENDANCE AT MEETINGS - CALENDAR YEAR 1950

Organization Sponsoring Meeting	Date and Place	Attendance		Purpose of Attendance or Nature of Meeting
		Total	BRC Employees	
Forest Service	3/14-17, Missoula, Mont.	60	Swanson, Walters, and 7	Review of BRC control area.
North Idaho Forestry Assn.	3/13-14, Spokane, Wash.	80	Swanson, Brischle, and 3	Timber Protective Assn. Quarterly Report on BRC.
High School	3/18, Clarks Fork, Idaho	75	Brischle	Talk on BRC to students and townspeople.
Whitworth College	3/23, Spokane, Wash.	33	Walters	Talk on BRC to Biology Club.
N.R.M.	4/11-12, Spokane, Wash.	60	Swanson, Moss	Forest, Range, Wildlife Research Conference.
S.A.F.	5/20, Bovill, Idaho	80	Swanson, Hartman	Field meeting. Discussion of BRC.
Timber Products Bureau	5/25-27, Missoula, Mont.	60	Swanson	General forestry and lumbering.
Hoo Hoo Club	6/2, Spokane, Wash.	30	Swanson	Talk on BRC.
North Idaho Forestry Assn.	6/12-13, Spokane, Wash.	60	Walters	Report on BRC.
Dom. Lab., B. C.	6/12-13, Nakusp, B. C.	50	Swanson	Talk on BRC. Pole Blight.
Task Force	6/22, Kalispell Bay, Idaho	10	Brischle	Report on BRC.
Task Force	6/24, Spokane, Wash.	10	Swanson	Report on BRC.
Idaho Land Board	7/8-11, Coolin, Idaho	60	Swanson, Brischle	Forestry, logging, and pest control.
P.F.I.	8/22, Bovill, Idaho	15	Hartman	Cutting practices and BRC.
P.F.I.	8/24-25, Pierce, Idaho	30	Swanson, Riley, Faulkner	Cutting practices and BRC.
T.P.A.	8/30, Moscow, Idaho	35	Hartman	Forest protection.
S.A.F.	10/14, Moscow, Idaho	60	Swanson, Bingham	Talks on rust resistant tree project.
Washington State Forestry Conf.	11/3, Spokane, Wash.	150	Swanson	Prepared paper presented on BRC.
Lion's Club	11/8, Spokane, Wash.	50	Skoglund	Illustrated talk on BRC.
North Idaho Forestry Assn.	11/27-28, Spokane, Wash.	80	Swanson, Brischle, and 4	Swanson and Brischle discussed BRC.
Western Forestry & Conservation Assn.	12/6-8, San Francisco, Calif.	400	Swanson	Report on BRC to Pest Control Comm.
N.W. Scientific Assn.	12/28-29, Spokane, Wash.	100	Swanson, Walters, and 4.	General forestry.